June 13, 2007

MEMORANDUM **UTAH DEPARTMENT OF TRANSPORTATION**

TO: Jim McMinimee, P.E., Chairman

FROM: Barry Axelrod
Recorder, Standards Committee

Barry Axelrod
Digitally signed by Barry Axelrod
DN: email=baxelrod@utah.gov, c=US, st=UT, l=Salt Lake City, ou=http://www.usertrust.com/cps, cn=Barry Axelrod
Reason: I attest to the accuracy and integrity of this document
Date: 2007.06.20 11:56:02 -06'00'

SUBJECT: Standards Committee Meeting Minutes and Next Meeting

The next meeting has been scheduled for Thursday, June 28, 2007 at 8:00 a.m., in the main 1st floor conference room of the Rampton Complex.

Item		**Remarks**	**Sponsor**
1.	Minutes of April 26, 2007	For approval	Barry Axelrod
2.	Supplemental Specification 03211, Reinforcing Steel and Welded Wire	For approval	Bob Nash
3.	Supplemental Specification 05120, Structural Steel	For approval	Bob Nash
4.	Supplemental Specification 03310, Structural Concrete	For approval	Matt Rink
5.	Supplemental Drawings, TC, Traffic Control Series. See listing.	For approval	John Leonard
6.	Update to Supplemental Specification 02373M	For approval	Degen Lewis
7.	Supplemental Specification 03055, Portland Cement Concrete	For approval	Degen Lewis
8.	Supplemental Specification 03390, Concrete Curing	For approval	Degen Lewis
9.	Supplemental Specification 03392, Penetrating Concrete Sealer	For approval	Degen Lewis
10.	Supplemental Drawing PV 4, Concrete Pavement Details for Urban and Interstate	For approval	Degen Lewis
11.	Supplemental Specification 02735, Micro-surfacing	For approval	Tim Biel
12.	Supplemental Specification 02789, Asphalt Slurry Seal Coat (Removed Department Special Provision)	For approval	Tim Biel
13.	Supplemental Specification 02786, Open-Graded Surface Course	For approval	Tim Biel
14.	Sub-Committee Update on other Standards Approvals	For approval	Robert Miles
15.	Review of Assignment/Action Log	For review	Jim McMinimee
16.	Meeting Improvements (on-going agenda item)	For discussion	Jim McMinimee
17.	Other Business	For discussion	Jim McMinimee

JCM/ba
Attachments

cc:

Cory Pope Director, Region One	Stan Burns Engineering Services	Robert Miles Standards
Randy Park Director, Region Two	Boyd Wheeler Bridge Design	Barry Axelrod Standards
David Nazare Director, Region Three	Vacant Construction	Patti Charles Standards
Dal Hawks Director, Region Four	Tim Biel Materials	Shana Lindsey Research
	Richard Clarke Maintenance	Tracy Conti Operations
	Robert Hull Traffic and Safety	Anthony Sarhan FHWA
	Michael Adams Traffic Management Division	Mont Wilson AGC
	Rex Harris Region 1, Preconstruction	Tyler Yorgason ACEC

Agenda Listing

Item 5:

TC 4	Traffic Control Urban Intersections With Roadways Under 50 MPH
TC 5	Traffic Control Urban Intersections With Roadways Under 50 MPH
TC 6	Traffic Control Pedestrian Routing
TC 7	Traffic Control Road Closed, Detour
TC 8	Traffic Control Lane Closure
TC 9	Traffic Control Multilane Closure
TC 10	Traffic Control Expressway And Freeway Crossover/Turn Around
TC 11	Traffic Control Exit Ramp Gore
TC 12	Traffic Control Entrance Ramp Gore
TC 13	Traffic Control Shoulder-Haul Road
TC 14	Traffic Control Flagging Operation
TC 15	Traffic Control 2 Lane/2 Way Seal Coat With Cover Material
TC 16	Traffic Control Pavement Marking

April 26, 2007

A regular meeting of the Standards Committee convened at 8:00 am, Thursday, April 26, 2007, in the 1st floor conference room of the Rampton Complex.

Members Present:

Darrell Giannonatti	Project Development (for Jim McMinimee)	Acting Chairman
Robert Miles	Standards and Specifications	Secretary
Barry Axelrod	Standards and Specifications	Recorder
Stan Burns	Engineering Services	Member
Randy Park	Region 2	Member
Karl Verhaeren	Construction	Member
Richard Clarke	Maintenance	Member
Wes Starkenburg	Traffic and Safety (for Robert Hull until agenda item 11)	Member
Robert Hull	Traffic and Safety	Member
Tim Biel	Materials	Member
Boyd Wheeler	Bridge Design	Member
Rex Harris	Region 1, Preconstruction	Member
Bryan Chamberlain	TOC	Member
Todd Emery	FHWA (for Anthony Sahan)	Advisory Member
Mont Wilson	AGC	Advisory Member
Tyler Yorgason	ACEC	Advisory Member

Members Absent:

Jim McMinimee	Project Development	Chairman
Anthony Sarhan	FHWA	Advisory Member

Staff:

Patti Charles	Standards and Specifications
Degen Lewis	Materials
Mike Romero	Bridge Design
Shana Lindsey	Research
Darin Sjoblom	Geotechnical
Jon Bishoff	Geotechnical
Keith Brown	Geotechnical
Ming Ming Jiang	Bridge Design
David Deng	Bridge Design
Becky Stromness	Environmental
Paul West	Environmental
Mike Donivan	Traffic and Safety
John Leonard	Traffic and Safety

Visitors:
None

Standards Committee Meeting

Minutes of the April 26, 2007 meeting:

1. Minutes of February 22, 2007 meeting were approved as written.

   Motion: Tim Biel made a motion to accept the minutes as written. Seconded by Boyd Wheeler. Passed unanimously.

2. Supplemental Specifications, General Provisions (Agenda Item 2) - Presented by Karl Verhaeren.

   Karl said these four sections are the last of the General Provisions they were looking at for updates. He said they reviewed them against AASHTO guide specs and other DOTs. Karl asked for questions, indicating there was not a lot to highlight. He said information was also rearranged in the sections. He said comments from Thom LeHolm and Margaret Gish on 00120 were taken into account. Karl said part of the change dealt with trying to be more consistent on how information is called out.

   Karl said the title of 00120 was also updated. Referring to 01280 Karl said a lot of the information was outdated.

   Discussion points were:

   - There was no significant discussion.

   Motion: Tim Biel made a motion to approve Supplemental Specifications 00120, 00515, 00820, and 01280 as discussed and modified. Seconded by Stan Burns. Passed unanimously.

3. Supplemental Specification and Supplemental Drawing, Embankment Related (Agenda Item 3) – Presented by Karl Verhaeren and Mike Romero.

   Karl said this change updated the version approved in November 2006, now including the provisions of 02332, Embankment for Bridge. Section 02332 is being recommended for deletion as part of this change. Karl said a new drawing is also included. He said when first proposed in November, Structures had some concerns on Embankment for Bridge so it was decided to bring it back separately.

   Mike commented on the drawing, DD 16. He commented that some of the radii needed to be updated as did the 9 ft offset, changing it to 10 ft. He said the slope needed to be shown on Section A-A.

Discussion points were:

- Mike asked about the specification references to the deleted sections. Barry commented that Supplemental Specifications are published for each of the deleted sections indicating that fact so any other section with a related section to one of those is covered. Barry said when the new book comes out the deleted sections go away and the related section information is updated to reflect new section numbers and name changes when required.

- Darrell asked if with the number of updates to the drawing did it need to come back for approval. Barry said he didn't think so.

- Referring to article 1.4, paragraph A4, Tim asked if it could be rewritten. He said the requirement is a little confusing as written. Tim provided suggested wording. Darrell commented that this change would also apply to 1.5C.

- There was no further significant discussion.

Motion: Tim Biel made a motion to approve Supplemental Specification 02056 and Supplemental Drawing DD 16 as discussed and modified and Supplemental Specification 02332 to delete Section 02332. Seconded by Stan Burns. Passed unanimously.

4. Supplemental Specification 01452, Pavement Smoothness (Agenda Item 4) – Presented by Karl Verhaeren.

Karl said the purpose of this change is to clarify requirements for testing and correction of shoulder profile defects. He said the change also includes other than California type profilograph equipment. Karl said the Contractor's quality control plan requirements were deleted. He said the title was also changed.

Discussion points were:

- Tim had a question on the $1000 amount in article 3.1 paragraph B3. Karl explained the requirement indicating there really was not any change in the concept.

- There was no further significant discussion.

Motion: Stan Burns made a motion to approve Supplemental Specification 01452 as presented. Seconded by Tim Biel. Passed unanimously.

5. Supplemental Specifications Deleting Current Standards (Agenda Item 5) - Presented by Karl Verhaeren.

This item was discussed separately.

Referring to the deletion of Section 02226, Karl said he noticed that a related item for 02221 later on in the agenda. Karl said there may have been some miscommunication, adding that he had sent Ming comments on this. Karl went on to say the requirements of 02226 would now be included in 02221 with other removals and a variety of items.

Discussion points were:

- Barry commented on agenda item 13 indicating it shows those changes for 2008 but this deletion is for the current version. Barry asked if this deletion should wait until 2008 or have the change to 02221 become effective now. The decision was to hold the deletion of 02226 until the 2008 version to go along with 02221. Karl said he would cover his comments on 02221 when that agenda item is covered later in the meeting.

- There was some discussion on owner responsibility of section 02221. Barry checked the listing and indicated it shows Structures as the contact area for that section. That can be updated as needed to reflect a better contact area.

- There was no further significant discussion.

Motion: Stan Burns made a motion to approve the deletion of Section 02226 for 2008. Seconded by Boyd Wheeler. Passed unanimously.

Section 02749 was covered next.

Karl said this section currently just references other sections and does not include any other information. He said there is no need to have the section adding that the section was created for bid item purposes. He said the Measurement and Payment information for 02741 would cover the requirements.

Discussion points were:

- There was no discussion.

Motion: Boyd Wheeler made a motion to approve Supplemental Specification 02749 to delete Section 02749. Seconded by Tim Biel. Passed unanimously.

6. Deletion of Standard Specifications for 2008 (Agenda Item 6) - Presented by Karl Verhaeren.

Karl said there are several sections that need to be written or removed. He said Section 02338 has not been used in the last five years. He said the same applied for Sections 02715, 02966, and 02967 with Section 02762 used two to three times and Section 02773 once. He said in discussion with Materials and other areas the thought was if the items were needed then Special Provisions could be written or resubmitted as a Standard if the need arises.

Discussion points were:

- Barry commented that because they are just for the 2008 version no Supplemental Specifications are needed and that the sections will just be removed in the 2008 version.

- Stan asked if someone in the future wanted to use one of these is there an old data base they can access so they don't have to reinvent the wheel. Barry said all specification files are maintained going back to 1999 so if something comes up they can provide the file. Stan asked if that is common knowledge. Barry said when people look on the Web for old specifications all they see other than the current version is contact information and archive files. The Web site directs people to the Standards Section.

- There was a discussion on Standard Drawings, particularly on the one dealing with plowable pavement markers. Karl mentioned that the submittal sheet refers to Standard Drawing BA 4E and that the reference to asphalt concrete curbs would need to be removed from that drawing. Referring to plowable pavement markers (ST 8) Karl asked if the specification needed to be revisited or removed from the list.

- There was no further discussion.

Motion: Randy Park made a motion to approve the deletion of Sections 02338, 02715, 02762, 02773, 02966, and 02967 as recommended with the suggestion for drawing updates for 2008. Seconded by Tim Biel. Passed unanimously.

Action Item: Standard Drawings BA 4E and ST 8 to be looked at for updates related to the deletion of these sections. Both drawings are Traffic and Safety drawings.

7. Supplemental Specification 02455, Driven Piles (Agenda Item 7) – Presented by Darin Sjoblom.

Darin said the updates came from the recent review by Structures and process changes Geotech made over the last couple of years. He said the specification was also reformatted to move information around in the section. Darin said proprietary language was also changed.

Darin said a new item was the addition of table 1 with information they had been using in Special Provisions over the last couple of years. He said the table is for price reduction pay factors for non-conforming pile driving tolerances. Darin said this applies for piles that are driven out of alignment or out of location. He said it is rarely possible to remove piles after being driven and piles that are out of alignment or location can adversely affect the foundation design and performance of a bridge. The price reduction table gives the resident engineer the ability to pay a reduced price for a driven pile, without requiring the pile to be removed or replaced at no cost. Darin said with this in effect the contractors seem to be more careful in driving the piles.

He said editorial changes were also made and that all changes have been thoroughly reviewed by Geotech and Structures.

Discussion points were:

- Darrell asked if any contractors commented on the changes. Darin said they did not receive any comments from AGC. Darin said because the new table was in use as a Special Provision they have seen it for a while.

- Darin commented on some changes to the coordinated copy. Based on a discussion with Boyd, Darin said the first reference to AASHTO in article 3.3, paragraph B4 should come out leaving just AWS D.1.1. He said the second reference is alright as shown. The references listing can remain as shown because it is a general reference to the subject.

- Darin also said the information on leads in 2.5F needed to be updated with the addition of F6, reading “Use fixed leads if necessary to maintain required driving tolerances described in this Section, article 3.3, paragraph C.” He said this comes from contractor comments about not having information on fixed leads in the specification. He went on to explain the process and requirement.

- Darrell asked if just the mention of the tolerances does anything for the Construction Division. Boyd said from his perspective the argument could be made that because you didn’t mention it and I can’t drive to the tolerances you can’t hold me to the tolerances. Randy said it seems like we are directing the contractor on how to do it and not on what we want.

- Referring to the requirements of 3.5 A2, a and b, Tim said he was confused. Tim said he didn't know the intent of subparagraph b. Tim said based on the wording he didn't know if you are doing a payment evaluation or a structural evaluation. The suggestion was the words "for payment" in b could come out. The suggestion was also made to make subparagraph c a part of b. Comments were also made on the phrase "deviation of over 400 psi below." Darin said he would fix all wording so that requirements are clearly stated. Barry said the wording can be worked out after if the concept is acceptable.

- Darrell asked if the data sheet at the end of the specification is available separately on the Web. Darin said it is attached to the specification adding that has never been a problem. Darrell asked if we didn't want to have it available electronically. Barry said the form could be added somewhere if that is needed. Darrell said he would rather see the capability to e-mail the data instead of providing it by hardcopy. Barry said he could work that out with Darin.

- There was no further discussion.

Motion: Boyd Wheeler made a motion to approve Supplemental Specification 02455 as discussed and modified. Seconded by Karl Verhaeren. Passed unanimously.

8. Supplemental Specification 02466, Drilled Shafts (Agenda Item 8) – Presented by Darin Sjoblom.

Darin said that Structures recommended many of the minor changes to this section. He said he is recommending the title change to reflect current practice. Related sections in other specifications are also impacted. Darin said that John Butterfield helped clear up some of the wording in the section.

Darin explained that the time frame referenced in article 3.1, paragraph A had caused problems with it being too restrictive. He said this came up during their review as something that needed to be added but during coordination he said they received several comments. As a result, Darin said they split the requirement into two areas, one for 48 hours and the other for 24.

Darin said construction tolerances were added to the section as something that was needed. Darin said their review committee also suggested adding the article on placing rebar cages.

Discussion points were:

- Barry said they are not changing the specifications impacted by title changes to other section until the 2008 version. He said to do it now would require dozens of Supplemental Specifications that are not really required.

- Boyd asked if the change to this section is for just 2008 or also effective for the 2005 version. Darin said he could go either way but would recommend 2005. Boyd asked Barry if there is a problem with the related sections. Barry said he did not see a problem, adding that this procedure has been in effect for several years and that he has not heard of any problems. Barry said problems can be addressed as they come up but based on past history he didn't expect any.

- Following Darin's presentation of the changes Stan asked if they wanted this for 2005 or 2008. Barry said they didn't have a problem. Darin said the section is a lot better with the added information.

- There was no further discussion.

Motion: Stan Burns made a motion to approve Supplemental Specification 02466 as discussed and modified. Seconded by Boyd Wheeler. Passed unanimously.

9. Supplemental Specification 02721, Untreated Base Course (Agenda Item 9) – Presented by Tim Biel.

Tim said this section was a difficult one to read, indicating it needed a lot of work. He said over the last 18 months they significantly revised material requirements (not quality related). He went on to explain some of those requirements. He said they also took out the text that allowed acceptance with a penalty. Tim said that means the contractor keeps reworking it until it meets the specification or the material is taken out and replaced.

Tim said the version being presented has been used on projects for the last year or so. Tim added that when not used contractors have called asking about this version. He said they are use to seeing and using this version. Tim said they have gone through two or three major revisions based on industry input, adding that he feels industry has a very good handle on the specification.

Discussion points were:

- Darrell asked if everyone is comfortable with the new tolerances. Tim said they made some adjustments on the low end now allowing them and also adjusted them on the high end. Tim went on to discuss acceptance, pointing out some of the items in the section.

- Tim said they came to the Committee around a year ago asking about the Minimum Sampling and Testing Requirements in the Special Provision. He said at that time the Minimum Sampling and Testing Requirements were added to the section because they didn't have a chance to do a global update to the Minimum Sampling and Testing Requirements at that time. Tim said that has since been completed and those requirements are now being removed from this section.

- Tim said he thinks they have worked out all the kinks in the section.

- There was no further discussion.

Motion: Randy Park made a motion to approve Supplemental Specification 02721 as presented. Seconded by Karl Verhaeren. Passed unanimously.

10. Supplemental Specification 02746, Hydrated Lime (Agenda Item 10) – Presented by Tim Biel.

Tim said the marination process was the major focus of this change along with editorial changes. He said they took out the verification part at the end of the section because the Post Lottman Data has not been done for quite a while. He said the references were updated.

Discussion points were:

- Stan commented about the marination hours, stating that it looks like those were increased from 24 to 48 hours. Tim agreed. Stan asked Mont is that had any impact on production. Mont indicated it did not.

- In response to a comment from Karl, Tim said this has only been used on two or three projects over the last few years and that 99 percent of what they do is the slurry.

- In response to other comments Tim said that marination is a more expensive process, further explaining the process.

- Tim said this is a simple change unless there is an issue with the 48 hours.

- There was no further discussion.

Motion: Stan Burns made a motion to approve Supplemental Specification 02746 as presented. Seconded by Boyd Wheeler. Passed unanimously.

11. Supplemental Specification 02785, Chip Seal (Agenda Item 11) – Presented by Tim Biel.

Tim said this is a major conceptual change. He said there had been three chip gradations but changed that to one. A task force made up of industry representatives along with the Pavement Council recommended a Type I and Type II. Tim went on to discuss chip sizes.

Tim said they had previously done a lot of viscosity testing. He said that has been changed to contractor testing requirements.

Tim said this change was reviewed by the Pavement Council over a six to eight month time period.

Tim said he had some format changes to look at from Tyler.

Discussion points were:

- Tyler said his comments were not content related.

- Barry pointed out that article 1.4 should be changed from “Contractor Submittals” to “Submittals.” He said he would go into more detail later in the meeting as part of his agenda item.

- Mont commented about the Special Provision reference in article 2.3, paragraph A. Tim said that is needed because it changes for every project. Barry pointed out that it is a Department Special Provision that can not become a Standard, one of two such items. Barry said the other is the Pre-Bid Special Provision.

- There was no further discussion.

Motion: Randy Park made a motion to approve Supplemental Specification 02785 as discussed and modified. Seconded by Stan Burns. Passed unanimously.

12. Supplemental Specification 03575, Flowable Fill (Agenda Item 12) – Presented by Tim Biel.

Tim said this change is mostly editorial. He said some of the references were changed in relation to blended cements. Tim said that the requirement to witness the trial batch was removed.

Discussion points were:

- In response to a comment from Darrell, Tim said the mix design requirement is still there and trial batch still needs to be done. He said we just do not have to witness the trial batch.

- There was no further discussion.

Motion: Stan Burns made a motion to approve Supplemental Specification 03575 as presented. Seconded by Randy Park. Passed unanimously.

Before continuing Stan asked to make a comment. He went on to complement and thank the Structures area for their work looking at all the Standards they have responsibility for and those that impact them. He said Ming and David will be covering items next while Mike covered his earlier. Stan said more will be presented over the next few months. He said Boyd has taken the lead on the review. Stan said many of the comments and changes are editorial but they wanted to give the people a chance to introduce themselves to the Committee.

13. Standard Specification Updates for 2008 (Agenda Item 13) – Presented by Ming Ming Jiang.

Ming presented his updates to Section 02221 first. He said most were editorial.

Discussion points were:

- Darrell asked if Karl's earlier comments were carried forward to this change. Stan said some of the comments may have been included in article 3.6. Darrell said there may have been additional discussions that needed to be included.

- There was no further discussion.

Motion: Stan Burns made a motion to approve Section 02221 for 2008 as presented. Boyd asked that the motion be amended to also check with Karl to make sure all his comments are included. The motion was amended. Seconded by Boyd Wheeler. Passed unanimously.

Barry pointed out that because this is for the 2008 version there will not be a Supplemental Specification issued for this change. In response to a question Barry said they are hoping to have all specifications ready to go to print in mid-November. Barry said the change will go into effect January 1, but the book probably wouldn't be ready for distribution for a few more weeks like in 2005.

Darrell asked FHWA if there was any problem getting approval of the new version prior to that time. Barry said that based on FHWA coordination on all items coming to the Standards Committee he didn't see any problem. Barry said they are making editorial changes but those do not impact any concepts in the specifications. Barry said all approved Supplemental Specifications to date and those approved the next few months automatically go into the change. Barry said FHWA has already approved those to date and provide approval for subsequent Supplemental Specification changes. Barry added that FHWA also sees all 2008 related changes that come to this Committee.

There was no additional discussion on the 2008 version and related approvals.

Action Item: Boyd to verify with Karl that all changes have been included.

Ming continued with Section 02225. Boyd said in the past this section had both partial and full depth removal, but the requirements were interchanged. He said this change now splits them out.

Discussion points were:

- Darrell asked about weight requirements. Boyd referred to article 3.2 paragraph B for limitations for partial depth removal.

- Darrell asked Mont if he had any issues on this. Someone asked Boyd why that limitation exists. Boyd said because the asphalt thickness is thin at 3 inches and the partial depth removal takes off 2 inches the heavy equipment defeats the purpose of the partial depth replacement.

- Darrell said he had a problem with that concept. He commented about pot-holing if not using full depth replacement. Boyd said the only time they use partial depth replacement is when they are taking care of the riding surface and expect to be back in the next three to five years to replace the deck.

- Darrell said he would like to hear from Operations on those partial depth replacements and if they have seen in the three to five year timeframe more pot-holing and other maintenance issues than normal from a full depth standpoint. Randy said he didn't know the answer, adding that we do not come back in three to five years as planned.

- Boyd said the projects with partial depth removal are less than five percent. He said if this Committee felt it should be an exception and taken out of the section he didn't have any objection. Darrell said no. Boyd went on to explain the full depth process.

- There was no additional discussion.

Motion: Stan Burns made a motion to approve Section 02225 for 2008 as discussed and modified. Seconded by Tim Biel. Passed unanimously.

14. New Standard Specifications for 2008 (Agenda Item 14) – Presented by David Deng.

David said he had two new sections to present. He said the purpose of the sections is to meet the Department's Strategic Direction. He said there is a need of having new specifications for prefabricated bridge elements on structures. David said they have done a few prefabricated deck replacements in the last few years and these sections help facilitate that process by turning Structures Special Provisions into Standard Specifications. David said the sections were sent around for region review.

Boyd said as they move forward they had a couple of projects move up on the schedule so their recommendation is for adoption as a Supplemental Specification instead of waiting for the 2008 version.

Discussion points were:

- In response to Boyd's recommendation Barry said the font would have to be changed back to the one in effect for the 2005 version and not use the new 2008 font. Barry asked if this applied for both sections. Boyd said it did.

David then went into specifics on Section 02982. He referred to past and current projects for usage.

Discussion points were:

- Stan commented about the polymer overlay and that it is being shown as removed in this version, but in your comments you said you were going to do a polymer overlay. David said it is not done as part of this Section. Karl said he had basically the same comment during coordination.

- Darrell asked if there is a program complete and in hand for this type of project.

- Discussion continued on pre-cast elements.

- Karl asked if the title needed to be changed to cover pre-cast items. Boyd said they chose this title because they anticipated grinding on the approach slab as well, adding that may or may not be pre-cast. He said this title is more general. Randy said that a clarification may be needed in article 1.1. There were a few comments but they were not understood. Karl said he thought the wording covered it.

Being no other questions Boyd asked David to continue with Section 03339.

David said this was a Special Provision they used and that it was updated to make it a Standard. He said this includes fabrication and installation.

Boyd said one of the comments they received during the review period was on non-shrink grout. He said a lot of the track change marks are because of the addition of that requirement to the section.

- Karl suggested that the submittals go under one article instead of the four as shown. Barry said he was also going to cover that as part of his later agenda item. Karl said the reference back to the product listing needs to be removed because we are moving away from that reference and related subject.

- Commenting on article 2.1 paragraph E 3, Stan asked if it would be easier to read if the requirements were listed in bullet format.

- In 2.1 G, Stan asked about the 56 day requirement for curing. He said he wasn't sure where that number comes from and why. Stan thought that when dealing with pre-fabricated panel he thought the 56 days into the schedule defeated that purpose. David said he didn't think so in that the 56 days could be in the yard. Tim said that you are going to have an issue with precasters wanting to store panels for 56 days if they are doing this on more than one job. Darrell said the 56 days is not acceptable, saying he needed more of an explanation of why.

- Stan said the original consultant who helped us do the Wanship structure was concerned about shrinkage. Stan said he assumed they were saying the longer the time the panel sits the better we have a handle on shrinkage. Stan said he is concerned with how that conflicts with the whole idea. Darrell said this goes beyond common sense.

- Tim said you may be able to work it out but the problem is you are going to have to make some sort of concession. He said he didn't think you were going to have a precaster who wants to store the panels in his yard for months. Tim said you (Boyd) will have to find a place to store them. Tim said he can live with the time frame, just the storage being an issue. Randy said he wasn't sure we would want them sitting out in the environment.

- Stan said we need to look at the time frame. Boyd said he thought they could back that off to 28 days. Boyd said the attempt at 56 days was to get rid of all the shrinkage cracking. Darrell said if not reasonable it would just be ignored.

- Stan said he talked to someone on the I 15 project and was told the contractor says we have strength so we are going to put the panel in. Stan said that could have been six or seven days. Stan again commented that the contractor is always saying we have strength so we are going to put them in.

- Randy said other states are ahead of us on this so it wouldn't hurt to look at what they are doing. Boyd said that was where they got the 56 days. Stan said that wouldn't work for example in New York.

- Boyd said they would revisit the time frame. Boyd asked if someone on the Committee would be a good contact to review the time frame to make sure they had an acceptable number. It was suggest that Stan be the contact.

- Barry asked if this would effect approval and when this would be ready to go or could it be worked out within the next week. Barry went on to say that if approved and published now they prefer not to come back next time and change the Supplemental Specification. Barry said they need a final version when approved.

Non-specific comment follows on approval process.

Darrell said he would like to bring up the fact that a small group is being put together to look at minor issues that usually come to this group. He thought this could be one of those times. He said Robert Miles would be in charge of that group. Stan commented that this is being done to handle the large flow of minor changes in preparation for the 2008 version and that Darrell was suggesting that Robert chair that group. Darrell concurred, adding that it would be with the blessing of this group.

Barry said they hand regular editorial changes and that this covers the area between that and the major changes that have to come to this Committee. Barry said the changes proposed by Ming might fall into that middle category. He said some of the deletions might fall there as well. Darrell said those items the Committee decided didn't have to come back for a full presentation would fall into that category.

Robert said they would take care of the issues in the sub-group. Karl said adjustments in specifications could be covered there as well. Robert said as it stands right now if Section 03339 is approved the number will be adjusted by the sub-group and at that point it would become a Supplemental Specification. Todd Emery said if that is going to be the process then Robert needs to work with Anthony for FHWA approval. Barry said they already discussed having an FHWA representative on the sub-group.

Discussion continued with the regular agenda item.

- Boyd asked if there were any other comments on Section 03339.

- Boyd commented that he had received comments from Mont about double checking the 30,000 psi pressure identified in Section 03339, article 3.3 paragraph A. Mont said the person commenting to him said the only pressure washer able to meet that pressure is hydro-demolition equipment. Mont said the specification needs a sand blasting option. Boyd said they would go back and verify that. Shana asked if they were going to add sand blasting. Boyd said he didn't think so. Boyd said using sand results in contamination so you have to come back with a second process. He said he would look at the pressure requirement and see if it can be changed.

- There was no further discussion.

Motion: Stan Burns made a motion to table approval of Section 03339 until the 56 day requirement has been resolved, using it as a Special Provision in the mean time, with it coming back to this Committee as a Supplemental Specification and be incorporated in the 2008 edition. Stan Burns then made a motion to approve Section 02982 as a Supplemental Specification for the 2005 instead of for 2008 as presented.

Darrell said Section 03339 would be used as a Special Provision and would come back through Robert's group.

Seconded by Richard Clarke. Passed unanimously.

Procedural note: A motion and vote to table an item is not required. An item can be tabled or deferred to another meeting through discussion.

Action Item: Section 03339 to be brought back for approval through the special sub-group.

15. Supplemental Specification 02822, Right of Way Fence and Gate and Supplemental Drawings FG 1A and FG 1B, Right of Way Fence and Gates (Wood Post) and FG 2A and FG 2B, Right of Way Fence and Gates (Metal Post) (Agenda Item 15) – Presented by Paul West.

Paul said over the years that he has worked here he as received several complaints that our 6 ft deer barrier fences are not high enough or adequate, particularly during snow season or if the deer are being chased. He said the recommendations he received are to extend the height to 8 ft. He said that can easily be done using a 10 ft steel post and two 50 ft meshes overlapped by 4 inches.

He said another comment was received from professors at Utah State University. They said the 6 x 6 mesh we are using now is big enough for deer to put their snout in and enlarge the hole. The deer can then crawl through. The professors suggested using a V-mesh. Paul said that mesh is being used in Sardine Canyon and may be in use elsewhere. Paul said this mesh is tough and can't be knocked over, suggesting we go with this type of mesh. Paul added that the Division of Wildlife Resources (DWR) is worried that in many areas deer herds are being decimated largely because of animals getting on the right of way and getting hit by trucks and cars. He said in many cases we don't know about truck hits because there is no damage to the truck. As a result we are getting a lot more deer kills than Traffic and Safety data indicates.

Discussion points were:

- Darrell asked if station supervisors are keeping any kind of animal counts. Richard said they would be doing better now because everything we are responsible to pick up will be done by contract and the rest by DWR.

- In response to a question on costs of the mesh Paul pointed out the cost figures in the submittal sheet. Paul said the cost of the mesh doubles from $1.50/ft to $3.00/ft.

- Stan asked about a cost/benefit ratio, saying that would have been helpful. He said it might be an easy sell to say it is going to cost this much more to put this in, but we are going to reduce accidents by this much. Paul said they don't know exactly how effective it would be, adding that he would estimate it to be 90 to 95 percent more effective.

- Shana said if this is effective then it would be beneficial. She asked Paul if there was any research on this that he had seen. Paul said he didn't know if there was any real research and that he was just going on recommendations from DWR where they are saying 6 ft is not high enough.

- Randy commented that a lot of places he sees deer hits we don't have any deer fences. He asked if there is any relationship from where we have deer fences and where we do not. He said he wondered if the majority of the hits are where there is no fence. Paul said it depends on the design and how you end the fence. Is it out in the middle of nowhere, into a slope, or some other kind of barrier?

- Karl asked if the current posts are 30 inches deep. Paul said 24 inches. Shana commented that they could do some research based on current projects they are working on.

- Richard said he didn't think we were replacing current fence but are just making this another option. Paul concurred. Darrell asked who in design makes that decision.

- Darrell asked if this would be for 2008. Paul said as soon as they could get it. Barry said it would be by Supplemental Specification and Supplemental Drawing.

- Karl asked about the 12 ft post indicated in FG 2A, Note 4. Paul said that would be corrected. Following up on other comments Paul said he checked to see if going down 2 ft was adequate and was told it was.

- Darrell asked if implemented, has anyone looked statewide of how many areas may be affected. Paul commented on hot-spots where in the state we have excessive numbers of kills.

- Randy asked if those are places where we have 6 ft fences. Paul said some are. Randy then asked if we have a lot of kills where we have 6 ft fence. He said one of his concerns is one of the things we always try to do with our Standards is what is the additional cost and the benefit. He said it would be nice to know our number of accidents and where the deer kills are compared to 6 ft fence and no fence. Randy said this is a pretty drastic change.

- Randy said he is also concerned about the 2 ft depth. He said from experience he didn't think 2 ft was very much for something of that height. There was an additional comment about wind load across an entire area versus an animal pushing against the fence in one spot.

- Stan said he agreed with Randy's comment about cost - benefit. He said we should look at the cost - benefit of this versus 6 and 8 ft. He said he thought we have the accident data, adding that this is a drastic change.

- Darrell said this needs to be followed up on with cost - benefit data. He said this could be put on the back burner and not reviewed again.

- Richard commented that we don't have to use it. Randy said when a designer sees the option it will be put on the project. Shana said we wouldn't want to approve it until more numbers are looked at.

- Karl said it looks like the changes in the drawing dictate changes to the specification. He asked will the specification allow options or just change requirements. Paul said he is suggesting we do away with the original Type G fence and use this Type G as shown in the change.

- Someone said it may be more expensive but in the long run we are going to find it a lot more beneficial.

- Darrell commented about dealing with a lot of safety items and the cost - benefit, discussing where we want to put our money and to extend the dollar as far as possible giving us the best benefit for our dollar. Darrell said that has been the philosophy of the Standards Committee and that we want to continue to carry that forward. Darrell said he would like to see a follow up report as what the benefits would be. Paul said he has a study coming that shows where the hot-spots are.

- Randy commented about their recent STIP workshop with the Transportation Commission. He said it was interesting where they reviewed where the contingency money would be spent. He said there is not substantial money enough to deal with fencing. He said it was interesting to listen to the other region directors talk about how many fencing projects they have to fund with contingency money because there is not appropriate budgeting anywhere else. He said we have to be very cautious where we add additional cost. Randy said we are just running out of money and we need to be very careful.

- Darrell asked if there is someone that can be put on this to work up something on hot-spots, what is there, and the number of kills. Shana commented that some of the data is available. Darrell said with us cutting out regular fence on projects now he said he doesn't see us going forward with double the cost until we have a better handle on it.

- Richard said they have done a lot of work in an attempt to reduce the number of deer kills. Darrell asked if we have any information on where we have gone in to try to reduce the number animal hits and has it been effective. Shana said they have a study that talks about wildlife hits but not in that detail.

- Darrell asked for an action log item for follow up. Barry commented that based on the discussion it looks like this specification and the drawings won't be ready for 2008 publication so when approved they would be 2008 Supplementals. Darrell said he understood. Barry commented about the October meeting and deadlines. Barry said this limits the time to resolve this. Barry said he wanted Paul and the Environmental section to understand that these items may not be in the 2008 version so there was no problem from that standpoint.

- Karl said that given the recommended changes it would be nice to see some of the fence up for a while before making it a Standard.

- Discussion continued on the depth for the pole. Comment indicated that in some cases it may not be possible to get the 30 inch depth. Karl said he was leery about the long term durability of the fence with the 10 ft posts with a depth of 20 inches. Karl said this is a big change from what we have been using. Someone commented that they thought the height was more important than the mesh.

- Darrell asked for a motion to hold the item and assign tasks outside the group. Barry said a motion is not needed.

- Darrell asked Shana to work with Paul to see what information is available and what has been done so far based on this discussion. Darrell asked the Committee if they were good with that direction. All agreed.

- Darrell thanked everyone and asked to see if more information could be gathered in time for the October meeting. Paul said he would get with Shana.

Action Item: Supplemental Specification 02822 and Supplemental Drawings FG 1A, FG 1B, FG 2A, and FG 2B to be brought back for approval at a later time. Research and Environmental to work together to gather more data and provide cost - benefit information.

16. Supplemental Drawings GW 5A, GW 5B, and GW 5C, Pedestrian Access (Agenda Item 16) – Presented by Wes Starkenburg.

Wes explained the changes. He said dimensioning for the detector panel was from the curb line but many people didn't know what that was. He said the wording was changed. Wes said other wording and notes were changed to make them clearer.

A lot of the recording in this area was not possible to understand because of soft speaking tone and excessive background noise and paper shuffling.

The following was copied from the submittal sheet in order to provide some background.

"Some of the dimensioning has changed, e.g. edge of detector panels nearest the street must now be at or within 2 inches of the back of curb, vs. previous requirement that they be 6 to 8 inches from curb flow line. This will avoid errors in placement as the back of curb is a well know point, the curb flow line in not. Added a detail for a parallel corner ramp illustrate new detail from APWA Standards. Clarified thickness of concrete in ramp areas exposed to turning trucks. Consolidated NOTES as GENERAL NOTES on Drawing GW 5A. Arranged notes so that notes repeated on GW 5B and GW 5C are numbered the same as on GW 5A. Renamed "transition" to "clear area" to conform to ADA definitions. Added a note that clarifies that grade breaks on ramps must be parallel to ramp running slope. Added clear area detail covering an area where mistakes often

occur. Corrected minor drafting errors. Moved details to provide room for new transition detail."

Discussion points were:

- There didn't appear to be any significant discussion. Some comments were just to clarify some details.

Motion: Richard Clarke made a motion to approve Supplemental Drawings GW 5A, GW 5B, and GW 5C as presented. Seconded by Robert Hull. Passed unanimously.

17. Rumble Strips, Supplemental Drawing PV 8, Rumble Strips Centerline Applications and UDOT Policy 06C-17, Use of Rumble Strips (Agenda Item 17) – Presented by Robert Hull.

Robert said the policy was presented at the last meeting and at the request of Jim McMinimee, he and Tracy Conti met with Jim to discuss concerns on wording interpretation. Robert said Jim was fine with the policy after that discussion. He said the main point was location of the rumble strips.

Discussion points were:

- Darrell asked if that was part of the litigation issue as to where we should be putting them and if placed did we have to maintain them. Robert agreed. Robert said that was why it was criteria driven that we would have to ask specific regions why they want them installed in the first place and once installed they had to be maintained. Robert said in the past we just left it open to whomever to design them into the project. He said criteria now specify where to install them.

- Darrell asked about "run off the road" crash documentation. Robert said we have all kinds of crash type. Robert compared it to the earlier discussion on deer fence. He commented that if we have deer hits, does that mean we go out and install deer fence. He said it would have to be higher than expected in that location before taking action. Darrell asked if we knew how many of those spots there are. Robert said no, referring to undivided roadways. It is on a project by project basis.

- Darrell asked if we have talked to our lawyers about putting rumble strips where they don't belong and the repercussions of taking those out. Robert said no. Robert said one thing we have to be careful about is if we have a roadway section with rumble strips and there are no "run off the road" crashes, what does that mean. Darrell said it goes back to before the rumble strips and what was the data at that time.

- Robert said the problem is going backwards and you have to be careful because it doesn't meet the current Standards and what does that mean. Darrell said programmatically we haven't solved anything.

- Darrell asked Robert if their work was going to continue to refine the process. Robert indicated he would have to because for example it was a pavement preservation project and they make a determination to only pave half shoulders and there are rumble strips in place that would have a huge impact whether they should exist or not. He said yes they would have to continue to look at it.

- Darrell asked if the policy was reviewed and approved by the Technical Committee. Robert said it went through months ago.

- Darrell asked if anyone had any comments on the policy.

- Shana asked Robert about a comment made earlier that secondary roads may not get rumble strips. She asked about the case where the secondary road had a lot of run off the road accidents and what would be recommended. Robert said it is case by case but probably if it were higher than expected. Robert said each roadway has different characteristics that have to be looked at.

- Darrell asked if the Technical Committee was satisfied on how we handle rumble strips. Robert said he thought it did, adding that it handles the subject much better than the past.

- Stan said at the last Standards Committee meeting there was some confusion as to whether it had gone through the Technical Committee so verification was needed. Darrell said we can continue based on this discussion and if issues come up they can be revisited.

- Robert said his biggest concern for this committee was the difference between what was in the policy and what was on the Standard Drawing. He said the drawing prior to the policy indicated the drawing was applicable to all secondary routes. He said that wording has now been removed. Darrell said the Standards Committee wanted to make sure the changes were carried through to the policy and drawing. Robert said the drawing has been changed so there is no implication that this applies to every section of roadway. He said once the criteria are met then the Standard Drawing would apply.

- Darrell said if this has gone through the Technical Committee then we can move forward. Robert said yes, adding that his focus for the Standards Committee was to clear up the drawing implications.

Moving on to the Standard Drawing, Robert asked if there were any questions about the drawing. John then discussed the drawing indicating that the problem areas were removed to clean up the notes. He said other than that it is the exact same drawing as presented at the last meeting and that had been used as a detail drawing on many projects. John said they were just waiting for the policy to be finished before bring the drawing up for approval.

Robert reviewed the previous notes and the current notes to point out the changes to comply with the policy. John said once the decision was made to install rumble strips the drawing then shows how to do it. He said the drawing does not show the thresholds; just how to build them once the decision is made.

Discussion points were:

- Darrell asked for questions on the Standard Drawing and if there were any other changes on the drawing.

- There was no discussion.

Motion: Richard Clarke made a motion to approve Supplemental Drawing PV 8 as presented. Seconded by Karl Verhaeren. Passed unanimously.

18. Supplemental Drawings, TC 1A, TC 1B, TC 1C, TC 1D, TC 2A, TC 2B, TC 3A, TC 3B, TC 3C, and TC 3D (Agenda Item 18) – Presented by John Leonard.

John said the Traffic Control (TC) Series Drawings have not been updated for a while and two MUTCD issues have been published. He said the TC drawings are broken into two groups. John said the TC 1 through 3 drawings are the nuts and bolts for typical applications. He said this is the first batch and are being brought up to MUTCD standards. He said a detailed list of the changes was also sent out with the drawings during coordination. John said they received and incorporated a lot of the comments into this change.

John said one of the big changes is that they are trying to respond requests, particularly the Maintenance area, to allow cones to be used at night. John said in his time with the Department cones were never allowed at night. He said there have been a lot of changes to include reflective sheeting and height of cones. John said three of the most key comments dealt with controlling the use of the cones at night. He said the intent is to allow use only short term at night, meaning they can not be used more than two nights in a row and when used at night someone has to be present. He gave an example stating that if the utility company does excavation they can't put out cones and then leave for the rest of the night.

John said the issue is how to control use. He said pavement marking can now be done at night on the freeway. He said tubular markers still can not be used at night because they do not have enough reflective area. John said using cones is not something new to the industry, just to UDOT.

John said on TC 1A they also added the Direction Indicator Barricade detail, the one with the arrow. He said this has also been in use for a while by the industry.

John said many of the drawings have been split up to avoid some of the clutter on the drawings to make them more readable.

He said the other major change is changing the flags that are required on the signs allowing the number to be reduced. He said they received positive comments on this change. He said flags are not visible at night so as a compromise they reduced the number of flags from three to two, but require a retroreflective edge banding. Adding the banding is a 50 percent increase in the cost of each flag so by eliminating one flag there is no change in the overall cost.

John said these are the two biggest changes being made. He said they did add a delineator mounted work sign (TC 1D). He said it is primarily used in Region 4. John said they crash tested the sign at Department expense so it is now authorized for use.

Referring to TC 2A, John said they cleaned up the mitigation details and showed some better detail, but no change in concept.

Discussion points were:

- In response to a question, John said the flow chart on TC 2A did not change other than wording cleanup to read better. He said the notes were moved to TC 2B to also clean up the drawing. John said the notes on TC 2B apply to all traffic control that includes all TC Series Standard Drawing, currently through TC 16.

- There was a question as to whether the details apply to all traffic control and that this drawing may be confusing. A suggestion was made to add wording above the notes as to applicability. John said that would be done.

- Referring to TC 2B, Karl said he didn't think we should have a reference to UDOT policy on the drawing. John said they received comments both ways on that reference. John said the comments for not including it indicted that contractors do not have access to UDOT policies. John said the drawings are also for the Resident Engineers (RE) and other UDOT personnel as well. John said the policy details something that is extremely misunderstood. John said if a contractor wanted the policy the RE could provide it.

- Referring to TC 3B, Karl commented about the end of the work zone on the end taper and the posted speed limit and end of road work. Karl asked if there was any thought about reversing the order of the signs. John said they could do either, adding that the thought process was to let the motorist know they were out of the work zone before resuming the normal speed. Karl said the end road work sign usually goes well after the end of the work zone. John said in this case it is only the distance "D" which is anywhere from 100 to 500 ft from the work zone so it is fairly close. John said this drawing is for reduced speed work zones and that the drawing is split from the standard work zone.

- Darrell asked if our traffic control suppliers have been made aware of these changes. John said it has been sent out and discussed, adding that this is something they are going to bid and be paid for. Darrell asked if it was going to be a surprise to them. John said it is always going to be a surprise to someone. John said the intent is that they will be aware of the changes and that UDOT will set some sort of implementation date to make it happen. John said as in the past we can set an implementation date like was done with the MUTCD.

- Referring to the TC 3 set of drawings, John said one thing that will be changing that is not on the drawings is that now all the traffic control devices are little triangles, but will be changed to squares so they look like other drawings.

- John went on to say they cleaned up the traffic control project limit signs. He said TC 3D is a new drawing, covering all the specialty signs. John said they were previously on several other drawings. He said the stop panel is included because the MUTCD calls for an 18 inch paddle but UDOT calls for a 24 inch one.

- John said they are now in the process of working on the remaining TC drawings, TC 4 through TC 16 and should be ready for the next meeting.

- Referring to TC 2A, Tyler commented about the reference to "outside work clear zones use devices," asking if there is a limit on how far outside the work clear zone you have to have devices. John said in using the mitigation chart if you are within the AASHTO clear zone you have to use the devices, but outside you don't. John said this is telling you that the work clear zone and the AASHTO clear zone are two different things. Recapping Tyler said then use the devices if within the AASHTO clear zone, but outside of the work clear zone. John indicated that was correct.

- Todd said he had two messages to deliver from FHWA. He said he didn't know what prompted the comments but they came from Roland. Todd said "approval is contingent upon meeting the MUTCD." John said everything in the drawings should meet the minimum MUTCD requirements, adding that the only changes are where we exceed those requirements.

- Robert said he know what the other message was. John commented that it was "why didn't you do something on such and such page." John went on to say that Roland has been an integral part of the review of these drawings, spending hours in his (John) office.

- Darrell asked why Roland still had those two comments. John said he thought Roland was just covering his bases. John said their intent was not to repeat what is out there. He said they have a little more on these drawings than he would on other drawings because contractors think these drawings are "stand-alone." He said they show pictures that they might have found in the MUTCD, but the thought process used in creating the drawings was "only where we exceed the MUTCD."

- Referring to TC 3B, note 2 where the contractor removes or covers the reduced speed limit signs, Tyler asked if that is going to be difficult to implement on a construction project with people traveling through there. John said the note came from Tyler's coordination comments and that contact with the Region Traffic Engineer was added based on the comments. John said it is not a hard thing to do and people would rather have to pay attention to the speed limit knowing that they could do a reasonable speed limit than have to do an unreasonable speed limit all the time that they tend to ignore. Tyler said he prefers this method but wondered if it hasn't been done like that before because of issues with the contractor. One comment indicated they didn't think so.

- There was no further discussion.

Motion: Robert Hull made a motion to approve Supplemental Drawings TC 1A, TC 1B, TC 1C, TC 1D, TC 2A, TC 2B, TC 3A, TC 3B, TC 3C, and TC 3D as discussed and modified. Seconded by Stan Burns. Passed unanimously.

19. Supplemental Specification 02891, Traffic Sign (Agenda Item 19) – Presented by Robert Hull and John Leonard.

Robert said they are proposing changing the Standard Specification for Traffic Sign, but more specifically the sheeting types specified in the specification. He said there are several issues, indicating that a Type III is what is specified now. Robert said Utah is one of three remaining states in the country that have that type in our specifications. He said it is about a 20 year old technology that is not being used anymore and is being phased out by the manufacturer. Robert said as a result no one is able to meet our specifications.

Robert said they are proposing changing the standard sheeting, but that process is complicated. He said there is a proposed ASTM Type XI sheeting. John said the sheeting they are proposing exists, but the problem is getting the ASTM designation. Robert said the sheeting exists and the characteristics of it are such that it is being tested for ASTM designation. A final ruling has not been made. Robert said this is the latest and greatest generation of sheeting.

Robert said the other component of this with the proposed ASTM sheeting is there are 15 states that are combining efforts for a Public Interest Finding that will be submitted to FHWA. He said it is a Public Interest Finding because there is only one manufacturer at this time that can meet the proposed ASTM standards and FHWA is concerned that we are specifying proprietary items.

Discussion points were:

- In response to a cost question and which type from Darrell, Robert said we are using the Type III on construction projects but that is not what we are using on state funded sign replacement projects. He said we are using a Type IX. John said the proposed Type XI is cheaper than the Type IX, adding that the analysis sheet in the package shows this.

- Robert said the reason we get improved performance with the sheeting for a lower cost than what we are currently using is that it is easier for the manufacturer to produce because there are less layers involved in the process and therefore less materials than even the Type IX. Robert said it can be produced at a lower cost.

- Robert said the other issue associated with that is the warranty is higher than our current Type III sheeting and the same as the Type IX.

- Robert said the final issue they have with the Type IX versus the Type XI is the fluorescent sheeting. He referred to the fluorescent sheeting, strong yellow-green on school signs and some of the enhanced warning signs. Robert said those are not available in Type III and at a higher cost in Type IX.

- With State money Robert said they are using a Type IX and proposing a Type XI for all applications because of the better price, better warranty, and better performance. He said the agenda package includes some pictures of the different types. Robert said the Type XI captures more of the light from headlights because of the way it is manufactured. He said other states are using the Type XI and eliminating the lighting for the signs. Robert said in some cases the Type XI unlit performs better at night than the Type IX when lighted.

- Robert said they feel there is a long term benefit to this.

- Todd said the second message from Roland is that based on what you (Robert) just said they can't approve this specification at this time. Both Robert and John said they understood that. Robert said FHWA can't approve this until the Public Interest Finding is complete.

- Darrell asked if the intent of this submittal was to get approval for use on State projects. Robert said yes, with the long term view for Federal projects once the hurdles are met. Stan asked if it could be used with State money on Interstates. John said they have been doing that.

- Karl said it looks like we might be better off not having the Feds participating. Stan asked if they knew when that finding would come. Robert said he couldn't say for sure, adding that he has had communication with the other AASHTO delegates he is working with. He said they are passing around a signature page and getting other things taken care of. He said his subcommittee meets in June so as a minimum it would be finalized at that time.

- Darrell asked how this would be handled without the designation. John said it can be written in technical jargon. He said they were hoping to have the designation passed before bringing the specification here for approval. He said they could specify it based on performance characteristics. John said that is not a problem and can be made as an editorial change to the specification.

- Stan asked Mont about the ramifications if the product were sole sourced. Mont said probably not to the prime contractor, but possibly to the subs. Robert said the sheeting is already showing up on our projects.

- John said they also received some comments on how call outs are done. He said the "PW" was changed to a "P." He said the changes were minor and are highlighted in the agenda copy, adding that editorial changes were also made. He said the military specification does not exist anymore.

- Karl said an addition is needed to article 1.6 for manufacturer's product data and specifications.

- There was no further discussion.

Motion: Karl Verhaeren made a motion to approve Supplemental Specification 02891 as discussed and modified.

- Todd commented about it being applicable only on state projects. Barry said he thought the section was going to be rewritten generically enough so that it would apply on all projects. Barry said if it isn't going to apply on Federal projects how do we make it a Standard and put it in our specification book. Barry said if FHWA isn't going to approve the section then we can't put it in the book.

- Darrell asked if we can call out for that sheet if we indicate meet or exceed the current specifications. Barry said he thought you were going to specify a requirement instead of meeting a type. Darrell asked if that were put in the specification would that satisfy FHWA. Robert commented about the ASTM designation. Todd said if you want to work on that. Barry said the update is needed within a week so it can be published.

- Darrell asked if that could go through Robert Miles' group once the FHWA buyoff has taken place. Barry said that is possible but the change won't be published this next time if that takes longer than a week. Barry said they have 10 days to publish unless they don't meet their requirement, but that doesn't give the user 10 days to get inputs in. Barry said he needs a week to complete the process. Barry said everything has to be posted at the same time or it doesn't get done.

- Darrell asked if it could be implemented as a required Special Provision once that is done.

- Karl asked if you revise the language to read Type IX or better and approve it that way would that work. Darrell said he would like to do it that way. There was a comment about leaving it as a Special Provision. Darrell than indicated the same thing about leaving it as a Special Provision, but since we approved it, it could just be put in after review by Robert.

- John said that what is being said is that it will be approved as Type IX or better with the provision that when the ASTM designation of XI is approved and the Public Interest Finding it will automatically go to Type XI to be done as an editorial change. Comment indicated yes.

- Barry said then we don't actually publish this as a Supplemental Specification this cycle. Robert said right.

- Darrell said he would still like to vote on it so it wouldn't have to come back here for just a minor change. Darrell asked Barry if this was good. Barry said as long as whatever is approved can be a Standard that's fine. Darrell said it will be and that we will get Roland's buy off.

- Darrell asked for a motion. John recapped the motion already made as something similar to "accept it with modifications as proposed, specifically that article 3.1, paragraph E3 indicate to meet or exceed the requirements of the ASTM Type IX with the understanding that once there is a formal designation of Type XI and the Public Interest Finding as prepared by the other states it will become an editorial change to meet the requirements of ASTM Type XI." Darrell asked if that modification to the motion was alright.

Karl concurred on the update motion. Seconded by Richard Clarke. Passed unanimously.

20. Supplemental Drawings, DD 14A, DD 14B, DD 15A1, DD 15A2, and DD 15B (Agenda Item 20) – Presented by John Leonard.

John said these are the drawings requested by the Standards Committee. He said they created a three and four legged intersection and broke that down to high and low speed as defined in the AASHTO Green Book.

John said he just received some editorial comments from Tyler that can easily be incorporated. John said a lot of other comments were received during the coordination process. He said it appears to be a buildable design for our people.

Discussion points were:

- Darrell asked Mont and Tyler for their comments. Neither had any comments.
- Someone asked if these are typically rural. John said they were because urban area requirements are different. The suggestion was made to include "rural" in the title of all the drawings instead of just the ones now showing that fact. John agreed.
- There was no further discussion.

Motion: Robert Hull made a motion to approve Supplemental Drawings DD 14A, DD 14B, DD 15A1, DD 15A2, and DD 15B as discussed and modified. Seconded by Richard Clarke. Passed unanimously.

21. Specification Format Change (Agenda Item 21) – Presented by Barry Axelrod.

Barry said this came as a recommendation from Degen Lewis in Materials to standardize parts of the specifications so that all specifications call out Section Includes, Related Sections, References, Definitions, and Submittals. Barry said every section would have those articles, adding that if nothing applies then "Not Used" would be shown. Barry said this would help get the submittal information all in one location instead of scattered throughout a section. Barry pointed out the example in the agenda package.

Barry said they already started doing this as part of the 2008 conversion process. He said this is for the 2008 version and will not impact any of the 2005 Supplemental Specifications approved today. Barry said this will be one of their training items during their May and June region visits. The Specification Writers' Guide will also be updated accordingly. Barry said there is no conceptual change in how projects are done. He said the goal is to standardize all specifications so users can find things in the same place all the time.

Discussion points were:

- Degen discussed this thoughts on the submittal process with the information found throughout applicable sections instead of one place for each section. He indicated he didn't think the definition part was needed. After suggesting that part he found that very few sections have definitions. Barry said that could easily be removed. (**Post meeting note:** During the region visits the recommendation was to leave it in.)

- Boyd asked about the submittals and if the intent was to just list the basics with more information in the remaining parts of the section or bring all submittal information to that article. Boyd said in some cases there are several paragraphs of submittal information. Degen said the Part 1 listing would just be a list of shop drawings and manufacturers certifications for example with the details later in the section. He thought this would just be a quick listing of what the contractor needs to submit. Barry said they would work with each area to make sure the submittals are moved properly.

- Karl said to do whatever makes sense. He said about half the sections already have an article titled submittals.

- Barry said this change is something they would like to try so they will work out the details.

- Tim asked if from now on would 1.5 always be submittals. Barry said the only exception would be if the CSI format required an article that based on that guidance fell between one these five items. Barry said they have not seen any so these five should be the standard.

- There was no further discussion.

Motion: Karl Verhaeren made a motion to approve the format change as discussed and modified. Seconded by Tim Biel. Passed unanimously.

22. Review of Assignment/Action Log (Agenda Item 22)

Barry covered the Action Log

- Item 1, Rumble Strips. This item was discussed under Agenda Item 17 with the approval of Supplemental Drawing PV 8. Item closed.

- Item 2, Three-Legged/ Four-Legged Intersection. This item was discussed under Agenda Item 20 with the approval of Supplemental Drawings DD 14A, DD 14B, DD 15A1, DD 15A2, and DD 15B. Item closed.

- Item 3, Supplemental Specification 01554. Tracking changed from 00555 to 01554. This item was incorporated at the request of the Standards Committee into the Traffic Spec 01554. This will be done in the review and modifications to this spec, before the August deadline.

- The status report as handed out at the meeting follows:

Action Item Update for April 26, 2007 Standards Committee Meeting

(As of April 10, 2007)

Item 1, Rumble Strips: New target date was set to April 2007 meeting during the February 2007 meeting. Scheduled on the agenda for approval of Supplemental Drawings PV 8 and final review/approval of the policy.

Item 2, New Drawing of Three-legged and Four-Legged Intersection: New target date was set to April 2007 meeting during the February 2007 meeting. Scheduled on the agenda. The drawings have been developed and coordination complete.

Item 3, Supplemental Specification 01554M, Traffic Control: New target date was set to April 2007 meeting during the February 2007 meeting. From John Leonard: We will incorporate it as requested by the Standards Committee into the Traffic Spec 01554. This will be done in the review and modifications to this spec, before the August deadline.

No new Action Log items from the February 2007 meeting.

23. Meeting Improvements (on-going agenda item) (Agenda Item 23): None

24. Other Business:

Darrell said this was the largest agenda ever for the Standards Committee. He then went on to thank Karl for all his work and effort as this is Karl's last Standards Committee meeting. Karl said he may still show up occasionally.

Barry asked to present one quick item. He said they have run out of the regular bound copies of the Spec Book so those are no longer available. He then showed the proof of the interim copies being printed and the current copy. Barry said they would be selling for the same price and that the web site would be updated. Barry said he wanted to bring up as a suggestion for thought about the binding. He asked if this same type of binding on the interim book should be used for the 2008 version. He said this binding was done by State Contract where the 2005 version had to go out for bids. Consensus indicated staying with the same style as the 2005 version. Many didn't think the interim binding would be as durable and stand up as long. Patti pointed out the size of the 2008 book would be somewhere between the two sizes being shown. The decision was made to stay with the hard bound book.

A motion was made, seconded, and approved to adjourn.

The next regular meeting of the Standards Committee has been scheduled for Thursday, June 28, 2007, at 8:00 a.m., in the 1st floor conference room of the Rampton Complex.

Approval of Minutes: The foregoing minutes were approved at a meeting of the Standards Committee held _____, 2007.

Assignment/Action Item Log

Date Initiated/Updated	Item #	Action	Assignments	Status	Target Date
August 25, 2005	1	- Supplemental Specification 01554, Traffic Control (originally tracked as 00555M, Prosecution and Progress, Limits of Operation): Coordinate the required action to have the process placed in the proper location, to the detail necessary and bring the recommendation to the Standards Committee for approval.	John Leonard	Open	August 2007 meeting
October 27, 2005		- Item not ready. To be reviewed by the Operations Engineer. Target date updated.	Tracy Conti Robert Hull		
February 23, 2006		- Direction being reviewed by upper management.			
April 27, 2006		- Still being review by upper management for direction.			
June 29, 2006		- No change other than item may be on hold.	Robert Hull		
August 31, 2006		- No change.			
November 30, 2006		- Item being reviewed. Changed to track as Section 01554.			
February 22, 2007		- Still being worked			
April 26, 2007		- This item was incorporated at the request of the Standards Committee into the Traffic Spec 01554. This will be done in the review and modifications to this spec, before the August deadline			
April 26, 2007	2	Standard Drawings BA 4E, W-Beam Guardrail Installations and ST 8, Plowable Pavement Markers to be looked at for updates related to the deletion of sections 02762, Plowable Pavement Markers and 02773, Asphalt Concrete Curb. For inclusion in 2008 version.	Robert Hull Mike Donivan (BA 4E) John Leonard (ST 8)	Open	No later than October 2007 meeting.

Date Initiated/Updated	Item #	Action	Assignments	Status	Target Date
April 26, 2007	3	Supplemental Specification 02221, Remove Structure and Obstruction. Boyd to verify with Karl that all changes have been included based on the meeting discussion.	Boyd Wheeler	Open	No later than October 2007 meeting.
April 26, 2007	4	Section 03339, Precast Concrete Deck Panel. To be brought back for approval through the special sub-group.	Boyd Wheeler David Deng	Open	No later than October 2007 meeting.
April 26, 2007	5	Supplemental Specification 02822, Right of Way Fence and Gate and Supplemental Drawings FG 1A, FG 1B, FG 2A, and FG 2B to be brought back for approval at a later time. Research and Environmental to work together to gather more data and provide cost - benefit information.	Paul West and Research Division	Open	No later than October 2007 meeting.

Closed Items From Last Meeting (April 26, 2007)					
Date Initiated/Updated	Prior Item #	Action	Assignments	Status	Target Date
June 27, 2002	1	Standard Drawing PV 8 (Rumble Strip)	Darrell to assign someone from Construction.	Closed	Closed
October 31, 2002			Richard Miller from Maintenance. Fred Doehring. Betty Purdie. Robert Hull to head the group.		
December 19, 2002		- Process being reviewed. Research looking into testing.	Robert Hull Stan Burns		
February 27, 2003		- A policy is to be developed over the next several months. **(Original PV 8 reviewed)**	Robert Hull		
April 24, 2003		- No change	Stan Burns		
June 26, 2003		- No further updates. Target date changed.			
August 28, 2003		- Progress continuing. To work with Research.			
October 30, 2003		- Process continuing.			
December 18, 2003		- Still being worked.			
February 26, 2004		- No update			
April 29, 2004		- Jim to follow up with Research.			
June 24, 2004		-Research has study with University of Utah			
August 26, 2004		- Research study complete. Policy being written.			
October 21, 2004		- Waiting for BYU study results.			
February 24, 2005		- Still being reviewed. Target changed.			
April 28, 2005		- No change			
June 30, 2005		- No one present to discuss.			
August 25, 2005		- QIT working on a policy. Item being tracked as Rumble Strip Policy.	Traffic and Safety - Robert Hull		
October 27, 2005		- December meeting canceled. Target date updated.			

	1	**Item continued.** Standard Drawing PV 8 (Rumble Strip)			
February 23, 2006		- Policy approved. Drawing to be completed.	Traffic and Safety - Robert Hull		
April 27, 2006		- Policy approval discussed. Never brought to Standards for review and approval.			
June 29, 2006		- Committee still needs to review the policy			
August 31, 2006		- No change in policy review requirement. Drawing needs to be created or current drawings updated.	Steve Anderson (drawings)		
November 30, 2006		- Item to be reviewed and updated to be consistent with Standard Drawings.	Robert Hull		
February 22, 2007		- Supplemental Drawing PV 8 and Policy on agenda. Discussed but not approved. Will be brought back to the next meeting. Robert Hull to meet with Tracy Conti, Jim McMinimee, and Robert Miles to discuss the policy.			
April 26, 2007		- Supplemental Drawing PV 8 approved.			

August 28, 2003	2	A new drawing depicting the three-legged/four-legged intersection to be developed.	John Leonard	Closed	Closed
October 30, 2003		- No change in status.			
December 18, 2003		- Target date set.			
February 26, 2004		- No change.			
April 29, 2004		- Being developed			
June 24, 2004		- No report. Not due until August. E-mail sent to SAF and RES.			
August 26, 2004		- No change except target date.			
October 21, 2004		- Still under development. Target date moved.			
February 24, 2005		- No change. Work priorities prevented further review.			
April 28, 2005		- No change			
June 30, 2005		- No one present to discuss.			
August 25, 2005		- Looking at three-legged intersection first.			
October 27, 2005		- Not due. No action required.			
February 23, 2006		- Reviewed by the Traffic Engineering Panel. Drawings being developed.	Richard Miller		
April 27, 2006		- Still on target for June 2006.	Steve Anderson		
June 29, 2006		- No new status. Standards to develop new drawing	Robert Hull		
August 31, 2006		- Drawing needs to be created.			
November 30, 2006		- Drawing developed and out for comment.			
February 22, 2007		- Still being worked. In coordination process.			
April 26, 2007		- Supplemental Drawings DD 14A, DD 14B, DD 15A1, DD 15A2, and DD 15B approved.			

Standards Committee Agenda Items Section

Submittal Sheets, Supplemental Specification Drafts, Standard Drawing Drafts, and other supporting data for the June 28, 2007 Standards Committee meeting follows.

Standards Committee Submittal Sheet

Name of preparer: Robert Nash
Title/Position of preparer: CE III/Design Engineer
Specification/Drawing/Item Title: Reinforcing Steel and Welded Wire
Specification/Drawing Number: Section 03211

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

Systematic update for 2008 Specifications and also inclusion of existing Structures Special Provision into the standard specification. This Special is not a Department Special Provision.

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

Nothing is changed.

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below. Indicate if no comments were received.

Note: There is a two-week response time set for this item.

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)

ACEC Comments: (Use as much space as necessary.)

Tyler Yorgason -Civil Science, Inc.- I did receive a comments from ACEC members regarding the Supplemental Specification 05120 Structural Steel. Below are comments received from Karl Verhaeraen; also a copy of his redline/strikeout version of the specification are attached.

Article 1.3 paragraph A - I would suggest this simply state “Certificates of Compliance” - Certificate of Compliance is defined in section 00570 and explained in more detail in Section 01455, article 1.8. A certificate of compliance is from the manufacturer and certifies the material meets the applicable specification. The full statement language is superfluous.

Article 1.3 paragraph D - I'm not sure what's happened in the tracked changes version, as it shows UDOT “Minimum Sampling and Testing Requirements” changed to “Minimum Sampling and Testing Guide.” The proposed version had “Requirements,” which is correct - it is not a “guide.” However the Minimum Sampling and Testing Requirements do not have any requirements for sampling reinforcing bars, therefore the sentence should end after “source,” striking “following UDOT's Minimum Sampling and Testing Requirements.”

“UDOT Minimum Sampling and Testing Requirements” should also be removed from article 1.2, References.

Thanks again for giving ACEC a chance to review and comment on these proposed changes.

Response-Article 1.3 paragraph A- Change made. It now reads, “ Furnish Certificates of Compliance from the manufacturer.”

Article 1.3 paragraph D and article 1.2 references- Changes made everything after “source” was deleted and article 1.2 paragraph H was removed.

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)

In order received.

Tim Biel-UDOT Materials Engineer-The regular spec looks OK, but it appears that your track-changes one does not represent the other. There are significant differences that contradict the supplemental, especially related to corrosion resistant steel and pavement dowels.

Response- Tracking was only done with the original specification and not the supplemental. Article 1.5 paragraph C and D were omitted in error. This has been corrected. The changes to pavement dowel bars and corrosion resistant steel were intentionally made by the review group. No change was made relative to these.

Robert Hull -Traffic and Safety Engineer- Traffic and Safety has no comments.

Robert Westover-Operations Engineer Region 3-no comment

Dennis Simper-North District Engineer Region 1- I think 1.5 C should remain. We have a problem with the contractor dumping the bars on the ground without any blocking. Response This was in error it has been put back in.

Richard Clarke-UDOT Maintenance Engineer-Maintenance has no problem with the changes

Rodney Terry-Materials Engineer Region 1- **Article 1.2. References** .H. The reference to UDOT Minimum Sampling and Testing Guide should be changed back to Requirements This reference can be dropped as the new Minimum Sampling and Testing Requirements (MS&TR) dated May 2007 do not make reference to reinforcing steel or welded wire.

Article 1.3 Submittals:
Paragraph D. makes reference to UDOT's MS&TR this should be eliminated and the description of the samples made here or refer to the appropriate Quality Management Plan.

Paragraph F. The test procedure for testing Butt splices to failure should be noted.

Article 2.5 Mechanical Anchorage Device.
Paragraph A. The test procedure for testing anchorage devices should be noted.

Response- Articles 1.2 paragraph H and 1.3 paragraph D same responses as above. Article 1.3 paragraph F and Article 2.5 paragraph A disagree. No changes made.

James Cox-District Engineer Region 3- No Comment

Construction Engineers

Contractors (Any additional contacts beyond “C” above.)

Suppliers

Consultants (as required) (Any additional contacts beyond “C” above.)

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

Others (as appropriate)

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)
   No change.

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)
   No change.

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

   Department supplemental specification is already being used, this will need to be discontinued. No training issues are anticipated.

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.
   No additional costs are anticipated.

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).
   No additional costs are anticipated.

3. Life cycle cost.
No additional costs are anticipated.

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)

No need to use special provision anymore. Updates will put in place practices form the AASHTO LRFD Bridge Construction Specifications for handling epoxy coated reinforcement. No costs are anticipated.

H. Safety Impacts?
No safety impacts.

I. History? Address issues relating to the current usage of the item and past reviews, approvals, and/or disapprovals.
Not applicable

Priority Explanation

Enter the appropriate priority in the box on the first page of the document.

Priority 1 Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.

Priority 2 Upon posting, this impacts projects being advertised.

Priority 3 Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

Supplemental Specification
2005 Standard Specification Book

SECTION 03211

REINFORCING STEEL AND WELDED WIRE

Delete Section 03211 and replace with the following:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and procedures for placing reinforcing steel and steel welded wire fabric.

B. Coating for reinforcing steel and steel welded wire fabric.

1.2 REFERENCES

A. AASHTO M 31: Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

B. AASHTO M 55: Steel Welded Wire Fabric, Plain, for Concrete Reinforcement

C. AASHTO M 111: Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

D. AASHTO M 284: Epoxy Coated Reinforcing Bars

E. ASTM A 36: Carbon Structural Steel

F. ASTM A 767: Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

G. CRSI Manual of Standard Practice

H. ~~UDOT Minimum Sampling and Testing Guide~~

~~I.~~ UDOT Quality Management Plans

1.3 SUBMITTALS

A. Furnish Certificates of Compliance from the manufacturer ~~stating that the materials meet this specification~~.

B. Prequalify all coatings meeting AASHTO M 284 Annex A1: Prequalification of Organic Coatings for Steel Reinforcing Bars.
   1. Furnish a copy of the Prequalification Test Report to the Department's Construction and Materials Division.
   2. Provide an 8-ounce sample of the coating material from each batch in conformance AASHTO M 284 Annex A1.2.2, to the Department's Construction and Material Division.

C. A copy of the purchase order or a detailed letter to the Engineer verifying the warehouses or fabricators of the steel reinforcing bars or welded wire reinforcement with required samples.

D. Samples of the steel reinforcing bars or welded wire reinforcement from the fabricator's source~~, following UDOT's Minimum Sampling and Testing Guide~~.
   1. Provide 3 samples of each size cut to 2 ft length.
   2. Samples may be waived if the original contract amount is less than 4,000 lb~~s~~.
   3. Supply test bars at no additional cost to Department.

E. Splice Shop Drawings: Submit five sets for approval showing the proposed number and locations of each mechanical butt splice splicing.
   1. Submit before ordering the reinforcing steel whenever splicing requirements vary from the plans and specifications, including all lengths including splices.

F. Submit two sample mechanical butt splices and test to destruction in the presence of the Engineer.

G. Reinforcing Steel Shop drawings.
   1. Submit before ordering the reinforcing steel whenever splicing requirements vary from the plans and specifications, including all lengths including splices.

1.4 QUALITY ASSURANCE

A. The Department may witness coating processes for project work and obtains random samples by heat number and manufacturer to conduct verification testing.

B. Prequalification:
   1. Epoxy Coating Suppliers: through UDOT's Quality Management Plan - Reinforcing Steel Epoxy Coating.
   2. Galvanized Coating Suppliers: through UDOT's Quality Management Plan - Reinforcing Steel Galvanized Coating.
   3. Reinforcing steel suppliers through UDOT's Quality Management Plan (QMP) for steel.

1.5 DELIVERY, STORAGE AND HANDLING

A. Do not damage the bars or the coating during handling and storage.
   1. Use systems with padded contact areas when handling epoxy coated bars.
   2. Pad all bundling bands for epoxy coated bars.
   3. Lift all bundles with strong-back, multiple supports, or a platform bridge.
   4. Do not drop or drag bars.

B. Repair damaged bars or coating at no additional cost to the Department.

C. Store bars above the surface of the ground on platforms, skids or other supports.

D. Upon delivery to the project site, cover epoxy coated reinforcing steel with an opaque covering.
   1. Cover epoxy coated reinforcing steel, ~~which~~that has been partially embedded in concrete or placed in formwork and not covered by concrete, with an opaque covering prior to 30 days exposure to sunlight.
   2. Place the opaque coverings in a manner to provide air circulation and prevent condensation on the reinforcing steel.

PART 2 PRODUCTS

2.1 REINFORCING STEEL

A. Deformed billet-steel bars as specified. Meet AASHTO M 31, Grade 60

2.2 EPOXY AND GALVANIZED COATINGS

A. As specified. Meet AASHTO M 284 OR AASHTO M 111.

B. Coat bars as shown on the plans.
   1. Maintain epoxy coating thickness between 8 and 12 mils.
   2. Maintain galvanized coating thickness as specified. ASTM A 767.

3. Coat bars after bending, unless the fabricator can show that satisfactory results can be obtained by coating before bending.
4. Reject any bent bars with visible cracks or damage in the coating.

2.3 WIRE AND WIRE REINFORCEMENT

A. Cold-Drawn Steel Wire: As specified. Meet AASHTO M 55.

B. Welded Steel Wire Reinforcement: As specified. Meet AASHTO M 55.

C. Tie Wire: 16 gauge before coating.
1. Use coated wire.

2.4 BAR SUPPORTS

A. Epoxy-coated, galvanized, or plastic-coated, or plastic bar supports:
1. Meet the requirements of the "Bar Support" chart following this Section.
2. Remove contaminants that affect the adhesion of the coating to the wire.
3. Use an electrostatic-spray method, fluidized bed, or flocking to apply an epoxy coating.
4. Apply plastic coating by spraying, dipping, or using as a powder.
5. Maintain galvanized coating thickness as specified. AASHTO M 111.
6. Maintain the thickness of epoxy or plastic coatings at a minimum of 5 mils with no maximum.
7. Use patching material per the manufacturer's recommendation to repair damaged coating.
   a. Use patching material that is compatible with the coating, and that is inert in concrete.
   b. Hanger marks on the coated bar supports that result from the coating application process are acceptable and are not considered damaged coating.

B. Precast concrete block bar supports:
1. Minimum 28-day compressive strength of 2,500 psi
2. Three inch thick supports with sides ranging from 4 inches to 6 inches with a minimum soil contact area of 24 in~~ch~~^{2}.

2.5 MECHANICAL ANCHORAGE DEVICE

A. Splice Coupler **(Same coating system as bar)**
1. Reinforcing steel splice coupler shown by tests to be capable of developing in tension 175 percent of the strength of the reinforcing bar without damage to the concrete.
2. Steel Plate: Meet ASTM A 36.

PART 3 EXECUTION

3.1 PLACEMENT

A. Maintain a clean surface keeping all reinforcement free from loose mill scale, loose or thick rust, dirt, paint, oil, or grease.

B. Bend all bars accurately.

C. Place all reinforcement in designated position and securely hold in position while placing and compacting concrete.

D. Wire bars together with ties at all intersections except when spacing is less than 9 inches in each direction, in which case, tie at alternate intersections.

E. Maintain the specified distance from the forms and between layers of reinforcement by means of prefabricated chairs, ties, hangers, or other approved devices.

F. Precast concrete block bar supports are only allowed when the concrete is placed in contact with the soil and then only as the support for the bottom mat of bars.

G. Do not tack weld reinforcing bars in place.

H. Overlap at least one panel of welded-wire fabric sheets to each other and fasten at the ends and edges.

I. Support reinforcing steel for concrete "T" beams, pier caps, approach slabs, and deck slabs on metal chairs or slab bolsters following this Section, article 2.4~~, Bar Supports~~.

J. Space chairs for supporting the top steel and bolsters for supporting the bottom steel not more than 4 ft on center of the bar in each direction.

K. Tie deck steel to beams or forms at regular intervals of not more than 5 ft on center along the beams to prevent steel movement during concrete placement.

L. Support reinforcing steel for slabs on grade on metal chairs attached to a sand plate, or use precast concrete block supports following this Section, article 2.4~~,~~ ~~Bar Supports~~.

M. Engineer verifies placing and fastening of reinforcement in each section of work before any concrete is deposited.

3.2 FIELD CUTTING

A. Saw or shear coated bars that are specified to be cut in the field. Do not flame cut.

B. Repair the sawed or sheared end using the specified patching or repair material.

3.3 SPLICING

A. Furnish all reinforcing steel in the lengths specified.

B. Do not splice bars, except where specified.

C. Stagger splices as far as possible.

D. Place and tie lapped splices in the bars. Maintain the minimum distance to the surface of the concrete shown.

E. Do not lap splice No. 14 and No. 18 bars.
   1. Use mechanical butt splices when using No. 14 or No. 18 bars.
      a. Decide the number and location of the splices with the following limitations:
         1) Extend bars a minimum of 10 ft above the top of footing.
         2) Stagger splices such that no particular bar designation is spliced more than 50 percent in 5 ft.
      b. Use a standard, approved, exothermic process for mechanical butt splicing where the molten filler metal, contained by a high-strength steel sleeve of larger inside diameter than the bars, is introduced into the annular space between bars and the sleeve and between the ends of the bars.
      c. After cooling and hardening of the filler metal, the splice must be capable of transferring the minimum ultimate tensile strength of the reinforcing bar from one bar to the other by the mechanical strength of the splice components.
      d. The splice must not depend on fusion of the filler metal with the bars.
         1) Do not heat the bars to their melting point during the splicing process.
         2) Do not allow the degree of heat required to affect the splice to decrease the structural properties of the bars or affect their original hardness.
      e. Splice according to the manufacturer's recommendations using the manufacturer's standard jigs, clamps, ignition devices, and other

required accessories to make splices. Preheat bars where required by the manufacturer.

F. Use one of the following mechanical butt splices for bars sizes No. 3 through No. 11 when designated on the plans. Follow the manufacturer's published recommendations for equipment and splicing procedures.

1. A full mechanical connection that develops in tension or compression at least 175 percent of the specified yield strength of the bar.
2. As described in this Section, article 3.3, ~~Splicing,~~ paragraph E.

3.4 BENDING

A. Bend reinforcement to the shapes specified. Refer to CRSI Manual of Standard Practice.

B. Do not heat the bars during the bending operations.

C. Cut and bend as specified.

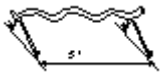
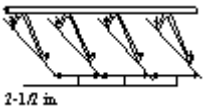
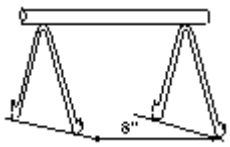
D. Complete all bending before coating except as specified for bent bars.

3.5 FIELD QUALITY CONTROL

A. Have the coated bars inspected for damage to the coating after the bars are in place and immediately before concrete placement.

B. Repair all visible defects using the specified method recommended by the coating manufacturer.

Bar Supports

Types and Sizes				Minimum Wire Sizes[2] and Geometry			
Symbol	**Bar Support Illustration**	**Type of Support**	**Standard Sizes**	**Nominal Height**	**Carbon Steel**		**Geometry**
					Top	**Legs**	
SB[1]		Slab Bolster	3/4, 1, 1-1/2, and 2 inch heights in 5 ft and 10 ft lengths	All	4 ga. Corrugated	6 ga.	Legs Spaced 5 inches on Center, Vertical Corrugations Spaced 1 inch on Center (See Note 3)
BB[1]		Beam Bolster	1, 1-1/2, and 2 inch; over 2 inch to 5 inch heights in increments of 1/4 inch lengths of 5 ft.	Up to 1-1/2 inch incl.	7 ga.	7 ga.	Legs Spaced 2-1/2 inches on Center (See Note 3)
				Over 1-1/2 inch to 2 inches incl.	7 ga.	7 ga.	
				Over 2 inches to 3-1/2 inches incl.	4 ga.	4 ga.	
				Over 3-1/2 inch	4 ga.	4 ga.	
BC		Individual Bar Chair	3/4, 1, 1-1/2, and 1-3/4 inch heights	All	-----	7 ga.	(See Note 3)
JC		Joist Chair	4, 5, and 6 inch widths and 3/4, 1, and 1-1/2 inch heights	All	-----	6 ga.	(See Note 3)
HC or HPC*	 * SAND PLATE NEED NOT BE COATED	Individual High Chair	2 inch to 15 inch heights in increments of 1/4 inch.	2 inches to 3-1/2 inches incl.	-----	4 ga.	Legs at 20 degree or less with vertical. When height exceeds 12 inches, legs are reinforced with welded crosswires or encircling wires (See Note 4)
				Over 3-1/2 inches to 5 inches incl.	-----	4 ga.	
				Over 5 inches to 9 inches incl.	-----	2 ga.	
				Over 9 inches to 15 inches incl.	-----	0 ga.	
CHC		Continuous High Chair	Same as HC in 5 ft and 10 ft lengths	2 inches to 3-1/2 inches incl.	2 ga.	4 ga.	Legs at 20 degree or less with vertical. All legs 8-1/4 inches on center maximum, with leg within 4 inches of end of chair, and spread between legs not less than 50 percent of nominal height. (See Note 5)
				Over 3-1/2 inches to 5 inches incl.	2 ga.	4 ga.	
				Over 5 inches to 9 inches incl.	2 ga.	2 ga.	
				Over 9 inches to 15 inches incl.	2 ga.	0 ga.	

Notes and Bar Supports Table, see next page.

Notes:

1. Top wire on continuous supports, not otherwise designated as corrugated, may be straight or corrugated at the option of the manufacturer.

2. Minimum wire sizes are American steel and wire gauges.

3. To provide adequate stability against overturning, the leg spread measured between points of support on the minor axis of the support shall not be less than 70 percent of the\ nominal height.

4. To provide adequate stability against overturning, the leg spread measured between points of support on the minor axis of the support shall not be less than 55 percent of the nominal height.

5. To provide adequate stability against overturning and to provide adequate load capacity, the leg spread measured between points of support on the minor axis of the support shall not exceed the minimum and maximum percentages of the nominal height, as shown.

Nominal Height (inches)	**Distance Between Supports as a Percent of Nominal Height**	
	Minimum	**Maximum**
Under 4	70	No Limit
4	70	95
6	65	90
8	60	85
10	55	80
12	50	75
Over12	50	75

END OF SECTION

Standards Committee Submittal Sheet

Name of preparer: Robert Nash
Title/Position of preparer: CE III/Design Engineer
Specification/Drawing/Item Title: Structural Steel
Specification/Drawing Number: Section 05120

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

Systematic update for 2008 Specifications and also inclusion of existing supplemental specification into the standard specification.

Effective for the 2005 version.

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

Nothing is changed.

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below. Indicate if no comments were received.

Note: There is a two-week response time set for this item.

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)

ACEC Comments: (Use as much space as necessary.)
Tyler Yorgason- Civil Science-I received comments from Karl Verhaeren… His comments are shown below
Article 1.4 paragraph C. 5.

Suggest revising to read:

"Allow 14 calendar days for the Engineer's review and approval each time drawings are submitted."

5a and 5b should go away. Notification and requests or claims for delays or additional time is more than adequately covered under the general provisions (00555 and 00725) and this information shouldn't be reiterated, or stated differently, in any other standard specification sections.

Response- Disagree with all comments. No changes made.

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)

In order received.
Robert Hull -Traffic and Safety Engineer- Traffic and Safety has no comments.

Robert Westover-Operations Engineer Region 3-In section 1.4.D.8 it says that an engineer will certify the erection plan. I wonder if it should be more clear that the contractor's engineer will certify the erection plan.

Response- Believe that it is clear as it now stands. No Action taken

Dennis Simper-North District Engineer Region 1-okay

Richard Clarke-UDOT Maintenance Engineer-Maintenance has no problem with the changes

Rodney Terry-Materials Engineer Region 1-I have reviewed the subject specification and have no comments.

Construction Engineers

Contractors (Any additional contacts beyond “C” above.)

Suppliers

Consultants (as required) (Any additional contacts beyond “C” above.)

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

Others (as appropriate)

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)
   No change.

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)
   No change.

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

Department supplemental specification is already being used, this will need to be discontinued. No training issues are anticipated.

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.
   No additional costs are anticipated.

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).
   No additional costs are anticipated.

3. Life cycle cost.
   No additional costs are anticipated.

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)
No need to use department supplemental anymore. Clarifications and updates will improve process. No costs are anticipated.

H. Safety Impacts?
No safety impacts.

I. History? Address issues relating to the current usage of the item and past reviews, approvals, and/or disapprovals.
Not applicable

Priority Explanation

Enter the appropriate priority in the box on the first page of the document.

Priority 1 Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.

Priority 2 Upon posting, this impacts projects being advertised.

Priority 3 Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

Supplemental Specification
2005 Standard Specification Book

SECTION 05120

STRUCTURAL STEEL

Delete Section 05120 and replace with the following:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and procedures for erecting structural metals.

1.2 RELATED SECTIONS

A. ~~A.~~ Section 05822: Bearings ~~Section 09972: Painting for Structural Steel~~

B. ~~Section 05822: Bearings~~ Section 09972: Painting for Structural Steel

1.3 REFERENCES

A. ~~AASHTO M 164: High-Strength Bolts for Structural Steel Joints~~AASHTO M 111: Standard Specification for Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products

~~B. AASHTO M 270 M: Carbon and High-Strength Low-Alloy Structural Steel Shapes, Plates, and Bars and Quenched-and-Tempered Alloy Structural Steel Plates for Bridges~~

~~C. AASHTO M 291: Carbon and Alloy Steel Nuts~~

~~D. AASHTO M 293: Hardened Steel Washers~~

~~E. AASHTO Standard Specifications for Highway Bridges~~

~~F. ASTM A 123: Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products~~

B. AASHTO M 164: Standard Specification for High-Strength Bolts for Structural Steel Joints

~~G. ASTM F 606: Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets~~

C. AASHTO M 270 ~~M~~: Standard Specification for Carbon and High-Strength Low-Alloy Structural Steel Shapes, Plates, and Bars and Quenched-and-Tempered Alloy Structural Steel Plates for Bridges

~~H. ASTM F 959: Compressible-Washer-Type Direct Tension Indicators for Use With Structural Fasteners~~

D. AASHTO M 291: Standard Specification for Carbon and Alloy Steel Nuts

~~I. ANSI/AASHTO/AWS D1.5~~

E. AASHTO M 293: Standard Specification for Hardened Steel Washers

F. AASHTO LRFD Bridge Construction Specifications

G. AASHTO/AWS D1.5 Bridge Welding Code

H. ASTM F 606: Standard Specification for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets

I. ASTM F 959: Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use With Structural Fasteners

J. UDOT Steel and Concrete Construction Manual

K. UDOT Quality Management Plan

L. American Institute of Steel Construction (AISC)

M. The Society for Protective Coatings (SSPC)

1.4 SUBMITTALS

A. Manufacturer's certificate of compliance for nut proof load tests as specified. AASHTO M 291.
   1. Certificate must show corresponding lot numbers appearing on the shipping package, certification, test location, time and date, and results of all testing.
   2. Include rotational capacity and proof load test results.

B. ~~Three copies~~Copy of certified mill test reports (MTR) for all fabricated structure materials, ~~7~~seven calendar days before fabrication, including materials manufactured outside the United States. Clearly indicate country of origin on MTR.

C. Shop Drawings: Submit five copies of shop detail drawings for all fabricated materials.

1. Submit ~~one set on 33 inch x 23 inch sheets with a 2 inch blank margin on the left edge and four~~five sets on 11 inch x 17 inch sheets with the ~~department~~Department project designation data, structure number, drawing number, and sheet number in the lower right corner.
2. All details are subject to modification or approval.
3. Do not order materials or begin work until receiving final approval of the shop detail drawings.
4. Do not deviate from the approved shop drawings unless authorized in writing. Contractor is responsible for costs incurred ~~doe~~due to faulty detailing or fabrication.
5. Engineer reserves the right to retain these drawings up to 14 calendar days without granting an increase in the number of working days for the project. This right applies each time the drawings are submitted.
   a. If the drawings are held in excess of 14 calendar days and cause a delay in the Contractor's operations, the contract time may be increased by the number of days delayed.
   b. Written notification and justification must be submitted within five working days after approval if claiming an increase in contract time.

~~1.5 QUALITY ASSURANCE~~

D. ~~A. Bolts and Nuts (Black and Galvanized): Subject to the Rotational Capacity Test, Section 8.5, and the following requirements.~~ Erection Plan for Bridges: Submit an Erection Plan 10 days prior to beginning erection of structural steel members for documentation purposes only. The Engineer will not approve the Erection Plan. Fully illustrate the proposed method of erection. Provide complete details of the process including, but not limited to:

1. Temporary supports, bracing, guys, dead-men, lifting devices, connection details and attachments to bridge members.
2. The schedule and sequence of erection, location of cranes, crane capacities, location of lifting points on the bridge members, member weights, and any other assumed loads.
3. Complete details for all anticipated phases and conditions during erection.
4. Minimum number of primary members, secondary members, connections, etc. that must be installed and properly connected to provide structural integrity and stability.
5. Supporting calculations in accordance with the current edition of the AASHTO LRFD Bridge Design Specifications to demonstrate that factored resistances are not exceeded and that member capacities and final geometry will be correct.
6. Incorporate into the plan the requirements from this ~~s~~Section ~~A~~article 3.6.

7. Bolting procedure for field splices and diaphragms on that meets American Institute of Steel Construction (AISC) Manual of Steel Construction requirements.
8. A professional engineer, licensed in the State of Utah, will approve, sign, and seal the Erection Plan and supporting calculations. The professional engineer must approve any and all changes to the Erection Plan prior to implementation.
9. UDOT prefers an ~~American Institute of Steel Construction (~~AISC~~)~~ Advanced Certified Steel Erector (ACSE)

PART 2 PRODUCTS

2.1 STRUCTURAL METALS

A. As specified unless otherwise indicated. Follow AASHTO LRFD Bridge Construction Specifications, Section 11.3.

2.2 HIGH TENSILE STRENGTH NUTS, BOLTS, AND WASHERS

A. Use bolts, nuts and washers displaying the manufacturer's markings.

B. Bolts: As specified in AASHTO M 164~~:~~ with the following modifications:

1. Maximum tensile strength:
   a. 150 ksi for bolts 1 inch or less in diameter
   b. 120 ksi for bolts larger than 1 inch in diameter

C. Nuts:
1. As specified in AASHTO M 291 or AASHTO M 293.
2. Use heat-treated Grades DH and 2H, except use Type DH3 nuts when Type 3 bolts are called for.

D. Washers: As specified in AASHTO M 293.

E. Load Indicator Washers: As specified in ASTM F 959.

F. Certification of Bolts and Nuts (Black and Galvanized): Subject to the Rotational Capacity Test, Section 6.3 AASHTO M 164 and the following requirements.
1. Go through twice the required number of turns (from snug tight condition) in a Skidmore-Wilhelm Calibrator or equivalent tension measuring device without stripping or failure as specified.
2. ~~Modify Table 8 in AASHTO M 164 as follows:~~

~~Bolt Length~~ ~~Bolt Diameters~~	~~Nominal Nut Rotation,~~ ~~Degree (Turn)~~
~~≤ 4~~ ~~> 4 and ≤ 8~~ ~~> 8~~	~~240 degrees (2/3)~~ ~~360 degrees (1)~~ ~~480 degrees (1-1/3)~~

~~3.~~ Maximum recorded tensile strength must be equal to or greater than 1.15 times the required fastener tension as specified.

43. Measured torque necessary to produce the required fastener tension must not exceed the value obtained by the following equation:

	Torque	≤	0.25 PD
Where:	Torque	=	Measured Torque (foot-lbs)
	P	=	Measured Bolt Tension (lbs)
	D	=	nominal diameter (feet)

~~5.~~4. Bolts and nuts require proof load tests as specified in ASTM F 606, Method 1 (Proof Load).

~~6.~~5. Bolts and nuts require wedge tests as specified in AASHTO M 164, Section ~~8.3.~~6.2.

~~B~~G. Foreign Materials:

1. ~~Have inspected, sampled, and tested at a distribution point in the United States, all materials that have been manufactured outside the United States.~~
2. ~~Furnish facilities and arrange for all testing beyond the Department's capability.~~
   a. ~~Engineer or Engineer's representative must witness all tests.~~
   b. ~~Reimburse Department for travel expenses if testing of foreign materials is conducted outside Utah.~~
   c. ~~Reimburse Department for all excess costs connected with out-of-state shop inspection for foreign materials including travel expenses or the services of an approved inspection agency~~
   d. ~~Pay for in-plant inspections deemed necessary.~~
3. ~~—~~Use foreign manufacturers who have previously established the ability to furnish material uniformly and consistently within the specifications.

~~C. Welding operators must be prequalified. Comply with UDOT Steel and Concrete Construction Manual.~~

~~PART 2 PRODUCTS~~

~~2.1 STRUCTURAL METALS~~

2.3 BEARINGS

A. ~~As specified unless otherwise indicated. Follow AASHTO Standard Specifications for Highway Bridges, Division II,~~Refer to Section 05822.~~11.3.~~

~~2.2 HIGH TENSILE STRENGTH NUTS, BOLTS, AND WASHERS~~

~~A. Use bolts, nuts and washers displaying the manufacturer's markings.~~

~~B. Bolts: As specified in AASHTO M 164 with the following modifications:~~
~~1. Maximum hardness: Rockwell C33~~
~~2. Minimum hardness: Rockwell C24~~
~~3. Maximum tensile strength:~~
~~a. 150 ksi for bolts 1 inch or less in diameter~~
~~b. 120 ksi for bolts larger than 1 inch in diameter~~
~~4. Lubricate bolts before installing~~

~~C. Nuts:~~
~~1. As specified in AASHTO M 291 or AASHTO M 293.~~
~~2. Use heat-treated Grades DH and 2H, except use Type DH3 nuts when Type 3 bolts are called for.~~

~~D. Washers: As specified in AASHTO M 293.~~

~~E. Load Indicator Washers: As specified in ASTM F 959.~~

~~2.3 ELASTOMERIC BEARING PADS~~

~~A. As specified in AASHTO Standard Specifications for Highway Bridges, Division II, Article 18.05822.~~

2.4 FABRICATION

A. ~~As~~Fabricate as specified in AASHTO ~~Standard~~ LRFD Bridge Construction Specifications ~~for Highway Bridges, and~~ Section 18, UDOT Steel and Concrete Construction Manual~~, ANSI/~~, and Steel Quality Management Plan. AASHTO/AWS D 1.5.

B. If steel structure is to be part of a bridge structure, the fabricator must have ~~American Institute of Steel Construction (~~ AISC~~), Category III, Quality~~ , Major Steel Bridge (CBR) Certification.

1. ~~Category III, Quality~~MSB(CBR) Certification not required for railings, grates, grate frames, and drain pipes. These items may be fabricated with Simple Steel Bridge Structures (SBR) Certification.

2.~~5~~4 APPROACH SLAB DRAIN ANGLES AND GRATE

A. AASHTO M 270, Grade 36.

B. Hot-dip galvanize after fabrication. ~~ASTM A 123.~~AASHTO M 111.

PART 3 EXECUTION

3.1 INSPECTION

A. Notify Engineer immediately upon placing the fabrication order to allow time for shop inspection.

1. Do not begin fabrication until arrangements for shop inspection have been made.
2. Facilitate inspection procedures on site and supply personnel as needed to properly inspect the work.

B. Allow authorized inspectors free and immediate access to all parts of the plant.

C. Furnish facilities for inspection of material and workmanship in the mill and shop.

D. The Inspector has the authority to reject any materials or work not meeting the specifications.

1. Material accepted by the Inspector may be rejected if found defective at a later time.

2. Replace or correct rejected material at no additional cost to the Department.
3. Contractor may appeal disputes with the Inspector to the Engineer for a final decision.

3.2 INSTALLING HIGH STRENGTH BOLTS

A. Testing:
1. Provide a Skidmore-Wilhelm calibrator or other acceptable bolt tension-indicating device for bolt testing at the job site.
2. Use direct-tension indicators with solid plates when the fastener-grip length is too short to be tested in a Skidmore-Wilhelm calibrator.
3. Check the direct-tension indicators in a Skidmore-Wilhelm calibrator using bolts of sufficient length before using.

B. Test the installed bolt/nut/washer assembly periodically to verify compliance.

C. Use direct-tension indicator washers as specified to tighten high strength bolts.
1. ASTM F 959.
2. Tighten bolts according to the manufacturer's methods and procedures or as modified by Engineer.
3. Tighten the fastener to reduce the gap to 0.005 inch or less regardless of which element is turned for tightening.

D. Install bolts as specified in AASHTO ~~Standard~~LRFD Bridge Construction Specifications ~~for Highway Bridges, Division II,~~ , Section 11.5.6.4 and ~~in~~use the following procedure.
1. Complete the *Bolted Field Splice Certification* form at the end of this section as bolt tightening progresses.
2. Place direct-tension indicator washer where the washers will not be embedded in concrete.
3. Use drift pins to align bolt holes and maintain dimensions and camber of the member.
4. Insert bolts in open holes with washers as specified by the manufacturer, and hand tighten.
5. Tighten at least 50 percent of the bolts (more as required) to approximately ~~1/2~~½ final tension to draw all plies of the connection into firm contact. Do not tighten any bolts to indicated full tension at this time.
6. Remove drift pins and replace with bolts.
7. Tighten ~~all bolts to full tension. Tighten~~ bolts progressively from fixed or rigid points to the free edges.
8. For field splices and diaphragms fully tighten 50 percent of bolts. Remaining bolts are to be snug tight before release of crane.
9. Tighten all bolts to full tension.

E. Store the bolts and nuts in the original containers until used.
   1. Protect from dirt and moisture.
   2. Remove only as many fasteners from protected storage as can be tightened during a work shift, and return unused fasteners to protected storage at the end of each work shift.
   3. Clean and re-lubricate fasteners that accumulate rust or dirt resulting from site conditions. Use manufacturer recommended lubricant.

3.3 WELDING

A. As specified in ~~ANSI/~~AASHTO/AWS D1.5, except as modified by the contract.

B. Field welds must meet the same requirements as shop welds, including inspection by the Department.

C. When AISC ~~Category III~~CBR Certification is required for the fabrication of the element, do all field welding under the ~~fabrication~~ certification.

D. ~~D.~~ Comply with welding procedures and inspection requirements. UDOT Steel and Concrete Construction Manual.

E. ~~For surface preparation and painting, refer to Section 09972.~~Welding operators must be pre-qualified. Comply with UDOT Steel and Concrete Construction Manual.

3.4 BEARINGS AND ANCHORAGES

A. Do not place masonry bearing plates upon bridge seat bearing areas that are improperly finished, deformed, or irregular. Set bearing plates level in exact position with full even bearing.

B. Locate the anchor bolts in relation to the slotted holes in expansion shoes to correspond with the temperatures at the time of erection. Adjust nut-gap on anchor bolts as shown at the expansion ends to permit free movement of the span.

C. Form bridge seat bearing areas and place anchor bolts according to details shown.

D. Place so that ~~I~~identification mark is ~~marking shall be on a face~~ visible after completion of the bridge.

E. Do not weld ~~E~~exterior plates of bearings ~~shall not be welded~~ unless at least 1.5~~"~~ inch~~es~~ of steel exists between the weld and the Elastomer.

1. Do not subject ~~In no case shall~~ the Elastomer or the bond ~~be subjected~~ to temperatures higher than 400 degrees F~~arenheit~~.

3.5 SURFACE PREPARATION STEEL

A. For surface preparation for painting of non weathering steel, refer to Section 09972.

B. Weathering steel:
1. Construct so that erection marks on the steel are not visible after the structure is completed.
2. Commercially blast all surfaces according to the specification standards. Meet SSPC-SP 6.
3. Commercially blast the following surfaces to meet SSPC-SP 10:
   a. Underside of the exterior portion of the top flange of fascia girders, and underside of ~~-~~bottom flange of all girders.
   b. The exterior portion of web of fascia girders.
   c. Top side and outside edge of the exterior portion of the bottom flange of fascia girders.
   d. All welded surfaces
4. Develop even patinas at completion of welding repair and after surface has been accepted by engineer.
5. Clean girders of any debris after deck concrete is placed
6. Redevelop patina as needed.

3.6 ERECTION

A. Maintain responsibility for all aspects of girder erection during all stages of construction, including the protection of structural steel members, the workers, and the traveling public.

B. Erect structural steel members in compliance with the Erection Plan and in a manner that prevents damage to all elements of the structure.

C. During erection, temporarily support, anchor and brace primary members such as beams and girders in a manner that will produce the proper alignment and camber in the completed structure.
1. Install cross frames and diagonal bracing as necessary to provide stability and assure correct geometry.
2. Provide temporary bracing or stiffening devices if necessary during any stage of erection.
3. Support, anchor and brace all erected superstructure members as detailed in the Erection Plan before allowing traffic under the bridge.

D. Design temporary supports and falsework in accordance with the current edition of the AASHTO LRFD Bridge Construction Specifications, Section 3 "Temporary Works."

E. Accurately assemble all parts as specified in the contract documents or erection drawings. Follow any match-marks.

F. Provide any additional materials that are required to keep both the temporary and final stresses within the allowable limits used in design.

G. Carefully handle materials so that no parts will be bent, broken, or otherwise damaged.
1. Do not injure or distort the members when hammering.

H. Before the members are assembled, clean bearing surfaces and surfaces that will be in permanent contact.

I. Do not open traffic under a partially-erected bridge superstructure, unless allowed in the Erection Plan or approved by the professional engineer who approved, signed, and sealed the Erection Plan.

END OF SECTION

Bolted Field Splice Certification follows.

Bolted Field Splice Certification

Consecutively number splices looking stations ahead and increasing from left to right. Copy this page as required. Initial the appropriate box to certify that the bolt tightening has been done in accordance with the specifications.

Do not perform final tightening until the inspector certifies that plates are drawn into full contact. Do not place concrete deck until the inspector has certified that all bolts are properly tightened. Prior to the final inspection, send a completed copy of this form to the State Bridge Engineer, 4501 South 2700 West, Salt Lake City, UT 84119.

Project Number Structure Number

Splice No.	**Top Flange**		**Web**		**Bottom Flange**	
Plates were drawn into contact with each other before final tightening of any bolts.	Contr. Initials	Inspect. Initials	Contr. Initials	Inspect. Initials	Contr. Initials	Inspect. Initials
Bolts are tightened to spec. (Gap under direct tension indicator is less than or equal to 0.005 inch.)	Contr. Initials	Inspect. Initials	Contr. Initials	Inspect. Initials	Contr. Initials	Inspect. Initials

Splice No.	**Top Flange**		**Web**		**Bottom Flange**	
Plates were drawn into contact with each other before final tightening of any bolts.	Contr. Initials	Inspect. Initials	Contr. Initials	Inspect. Initials	Contr. Initials	Inspect. Initials
Bolts are tightened to spec. (Gap under direct tension indicator is less than or equal to 0.005 inch.)	Contr. Initials	Inspect. Initials	Contr. Initials	Inspect. Initials	Contr. Initials	Inspect. Initials

Splice No.	**Top Flange**		**Web**		**Bottom Flange**	
Plates were drawn into contact with each other before final tightening of any bolts.	Contr. Initials	Inspect. Initials	Contr. Initials	Inspect. Initials	Contr. Initials	Inspect. Initials
Bolts are tightened to spec. (Gap under direct tension indicator is less than or equal to 0.005 inch.)	Contr. Initials	Inspect. Initials	Contr. Initials	Inspect. Initials	Contr. Initials	Inspect. Initials

Standards Committee Submittal Sheet

Name of preparer: Matt Rink
Title/Position of preparer: Senior Design Engineer
Specification/Drawing/Item Title: Structural Concrete
Specification/Drawing Number: 03310

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

1. Verbiage was added throughout to allow use of high early strength concrete where called for on projects – especially where ABC is used.
2. Hot and cold weather limitations were removed from Standard Specification 03055, Portland Cement Concrete and thus needed to be added to this specification.
3. Cure times were reduced from 14 days to 7 days because history has shown that required strengths and desired durability can be obtained in 7 days thus reducing construction time.
4. Standard Specification 03932, Concrete Slope Protection Repair was deleted in its entirety and its applicable verbiage was added to this specification.
5. Verbiage was added to address the use of pre-cast concrete deck panels.

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

No modification to the existing Measurement and Payment document needed.

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below. Indicate if no comments were received.

Note: There is a two-week response time set for this item.

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)

Sent to Mont Wilson of AGC via e-mail at mont.Wilson@gcinc.com.
No comments were received even after a second follow up e-mail.

ACEC Comments: (Use as much space as necessary.)

Sent to Tyler Yorgason of ACEC via e-mail at tyorgason@civilscience.com.
He replied with comments via e-mail as follows:

> I received a few comments regarding the proposed revisions to Specification 3310 - Structural Concrete, mainly from Dan Church at PB. They include:
>
> Page 2, Article 1.3.H: Add “Standards” after (ACI).
>
> Page 6, Article 3.1.A.2.b: Revise “test loads” to “load tests.”
> Revise “licensed engineer” to “Licensed Professional Engineer.”
>
> Page 7, Article 3.1.C.1: Revise “Earthwork” to “Excavation.”
>
> Page 8, Article 3.4.B.4: Revise “pavement” to “slope protection.”
>
> Page 20, Article 3.15.J.1: Delete “and repair per Article 2.2.”
>
> All comments were incorporated, but the first and the last. The first was not incorporated because it did not make sense and the last was not incorporated because the reference to Article 2.2 is needed for treatment of the rebar after it is cut off.

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)

Sent to Degen Lewis in Materials via e-mail. Comments regarding the need to include hot/cold weather limitations were received back and incorporated.

Sent to Boyd Wheeler in Structures via e-mail. Comments regarding high early strength concrete, cure times, concrete slope protection repair and precast concrete deck panels were received back and incorporated.

Sent to all RMEs (John Butterfield, James Cox, Larry Gay and Rodney Terry) via e-mail twice. Only editorial comments were received back.

Construction Engineers

Sent to Scott Andrus, Robert Dowell, Kevin Griffin, Hugh Kirkham, Scott Munson, Betty Purdie, Dennis Simper, Robert Westover and Rob Wight via e-mail.

All had either no comments or only editorial comments even after a second follow up e-mail.

Contractors (Any additional contacts beyond “C” above.)

Sent to Allen Gerber of Gerber Construction Company.
Sent to Eric Wells of Gerber Construction Company.
Sent to Ty Wadsworth of Wadsworth Brothers Construction Company.

None of the three had any comments.

Suppliers

No suppliers were contacted for comment.

Consultants (as required) (Any additional contacts beyond “C” above.)

Sent to Karl Verhaeren of Horrocks Engineers multiple times.
Only editorial comments were received back and they were incorporated.

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

Sent to Anthony Sarhan via e-mail at Anthony.sarhan@dot.gov.
No comments were received even after a second follow up e-mail

Others (as appropriate)

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)

   No impacts.

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)

   No impacts.

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

   No impacts.

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.

   No increase.

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).

   No impacts.

3. Life cycle cost.

   No impacts.

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)

Speed of construction over past methods due to use of ABC and reduction of cure times.

H. Safety Impacts?

None.

I. History? Address issues relating to the current usage of the item and past reviews, approvals, and/or disapprovals.

Current issues relating to use of ABC methods are due to unfamiliarity with the process and should be eliminated with more exposure and continual refining.

Priority Explanation

Enter the appropriate priority in the box on the first page of the document.

Priority 1 Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.

Priority 2 Upon posting, this impacts projects being advertised.

Priority 3 Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

Supplemental Specification
2005 Standard Specification Book

SECTION 03310

STRUCTURAL CONCRETE

Delete Section 03310 and replace with the following:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. ~~A.~~ Materials and procedures for constructing structural concrete, including box culverts, concrete slope protection, diversion boxes, catch basins, ~~and~~ cleanout boxes and other items as specified.

B. High Early Strength Concrete for closure joint at each end of bridge deck and the longitudinal or transverse closure joints between all the precast concrete deck panels, bridge parapets and approach slabs as shown on plans.

1.2 RELATED SECTIONS

A. Section 00555: Prosecution and Progress

B. Section ~~02316: Roadway~~02317: Structural Excavation

C. Section 02752: Portland Cement Concrete Pavement

~~D. Section 02844: Concrete Barrier~~

~~E~~D. Section 03055: Portland Cement Concrete

~~F~~E. Section 03152: Concrete Joint Control

~~G~~F. Section 03211: Reinforcing Steel and Welded Wire

~~H~~G. Section 03390: Concrete Curing

~~I~~H. ~~Section 05832: Expansion Joints~~Section 05822: Bearings

~~J~~I. ~~Section 05822: Bearings~~Section 05832: Expansion Joints

1.3 REFERENCES

A. AASHTO M 85: Standard Specification for Portland Cement (Chemical and Physical)

B. AASHTO M 111: Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products

~~B.~~C. AASHTO M 148: Liquid Membrane-Forming Compounds for Curing Concrete

~~C.~~D. AASHTO M 153: Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

~~D. AASHTO M 183: StructuralSteel~~AASHTO M 183: Structural Steel)

E. AASHTO M 213: Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

F. AASHTO M 235: Epoxy Resin Adhesives

~~G. AASHTO Division II Section 3~~G. AASHTO LRFD Bridge Construction Specifications Section 3 (Temporary Works)

H. ASTM C 578: Rigid, Cellular Polystyrene Thermal Insulation

I. American Concrete Institute (ACI)

1.4 SUBMITTALS

A. Falsework Drawing:

1. When required in the contract or requested by the Engineer, submit for approval three copies of falsework drawings and design calculations (prepared and sealed by a licensed professional engineer in the State of Utah) at least three weeks before construction starts.
2. Comply with AASHTO LRFD Bridge Construction Specifications Section 3 (Temporary Works).

B. When specified in the plans, design and submit to the Engineer for approval a High Early Strength Concrete mix design, which attains a 24 hour compressive strength of 3000 psi and a 28-day compressive strength (f ‘c) of 4000 psi minimum. Provide a certificate stating that the mix submitted meets the requirements for coarse aggregate, fine aggregate, cement, water, admixtures and curing materials in Section 03055 at least two weeks before its use.

C. Cold Weather Plan according to this Section, ~~A~~article 3.8 ~~this Section~~.

D. Surface Evaporation Plan according to this Section, ~~A~~article 3.8 ~~this Section~~.

~~1.4~~1.5 ACCEPTANCE- Price Adjustments for Strength

A. Use a pay factor of 1.0 when concrete strength meets or exceeds the specified strength.

B. When concrete is below specified strength:
   1. Department may accept item at a reduced price.
   2. The pay factor applies to the portion of the item that is represented by the strength tests that fall below specified strength.
   3. Department calculates the pay factor as follows:

Percent below specified strength:	Pay Factor:
0-2 percent	0.9
2-4 percent	0.8
4-6 percent	0.7
6-8 percent	0.6
8-10 percent	0.5

   4. Remove and replace all concrete represented by the test if the concrete strength is less than 90 percent of the specified strength.

~~1.5 SUBMITTALS~~

~~1.5 SUBMITTALS~~

~~A. Falsework Drawing: When required in the contract, submit three copies (prepared by a licensed engineer) for approval at least three weeks before constructionstarts.~~

~~starts.~~

~~B. Use AASHTO Division II Section 3 (Temporary Work) for minimum designcriteria.~~

~~criteria.~~

PART 2 PRODUCTS

2.1 CONCRETE

A. ~~A.~~ Class AA(AE) concrete, unless specified otherwise.
1. Meet a 28-day flexural strength of 650 psi verified through trial batch.

B. Concrete Slope Protection: Class A(AE).

C. Refer to Section 03055.

D. For High Early Strength Concrete ~~will be~~use air-entrained concrete composed of Portland Cement, fine and coarse aggregate, admixtures, and water.
1. ~~The air- entraining feature may be obtained by the u~~Use ~~of~~ either air-entraining Portland cement or an approved air-entraining admixture to obtain the air entraining feature.
a. The entrained air content ~~will~~ to be ~~not~~no less than 4 percent or more than 7 percent.
2. Use Type III cement for High Early Strength Concrete.
3. ~~Cement will c~~Conform to the requirements of AASHTO M 85 for cement.

2.2 REINFORCING STEEL AND WELDED WIRE ~~(COATED)~~

A. Refer to Section 03211.

2.3 JOINTS AND SEALERS

A. Pre-Molded Joint Filler meeting AASHTO M 153.
1. Concrete Slope Protection: Refer to Section 03152.

B. Preformed Joint Filler: AASHTO M 213.

2.4 BACKER ROD

A. Use backer rod composed of closed-cell polyethylene foam of sufficient size to prevent the sealant from passing to the bottom of the groove.

B. Refer to Section 03152.

2.5 WATERSTOPS

A. Refer to Section 03152.

2.6 RIGID PLASTIC FOAM

A. Preformed, extruded, cellular polystyrene thermal insulation material that has a water absorption property of 0.3 or less.

B. Refer to ASTM C 578.

2.7 CURING COMPOUND

A. As specified. AASHTO M 148, Type I-D, Class A.

2.8 FORMS

A. Plywood, wood, metal, glass, or a combination of these materials.

~~**2.9 BARRIERREFLECTORS**~~

~~A. Refer to Section 02844.~~

~~**REFLECTORS**~~

~~A. Refer to Section 02844.~~

~~B. Comply with GW series StandardDrawings.~~

~~**2.10 PARAPET CONNECTION BARS**~~

~~A. AASHTO M 183~~

~~Drawings.~~

~~**2.10 PARAPET CONNECTION BARS**~~

~~A. AASHTO M 183~~

~~B. Galvanize as indicated on the drawings. AASHTO M111.~~

~~**2.11 PARAPET ANCHOR BOLTS**~~

~~111.~~

~~**2.11 PARAPET ANCHOR BOLTS**~~

~~Meet AASHTO M 213.~~

2.9 MISCELLANEOUS STEEL ITEMS

A. Galvanize all miscellaneous steel items permanently cast into structural concrete elements (AASHTO M111).

PART 3 EXECUTION

3.1 PREPARATION

A. Falsework
   1. Construction:
      a. Use materials able to sustain the stresses required by the falsework design.
      b. Use suitable jacks or wedges to set the forms to the grade or camber required, and to prevent settling.
      c. Produce a finished structure of the specified camber, and built to the lines and grades indicated.
   2. Footing Construction:
      a. Build falsework on a solid footing that is safe against undermining, protected from softening, and capable of supporting any imposed loads.
      b. Demonstrate that the soil bearing values do not exceed the supporting capacity of the soil. (Conduct ~~test loads~~load tests or have soils investigation conducted by a licensed professional engineer.)
      c. Use piling or caissons to support falsework that cannot be founded on a solid footing.
      d. ~~d.~~ Space, drive, and remove piles following approved falsework drawings.
   3. Design and construct all falsework according to AASHTO LRFD Bridge Construction Specifications Section 3 (Temporary Works).

B. Forms
   1. Use mortar-tight concrete forms, true to the dimensions, lines, and grades of the structure, and of sufficient strength to prevent deflection during the placement of concrete.
   2. Discontinue using any form or forming system that produces a concrete surface with excessive undulations until modifications have been made. Undulations are excessive if they exceed either 1/8 inches or 1/270 of the center-to-center distance between studs, joints, forms, fasteners, or wales.
   3. Countersink all bolt and rivet holes when using metal forms for exposed surfaces so that a plane, smooth surface of the desired contour is obtained.

4. Use lumber that is free of knotholes, loose knots, cracks, splits, warps, or other defects that affect the strength or appearance of the structure. Rough lumber may be used for forming surfaces if visible rough surfaces do not show on the final structure.
5. Form all exposed surfaces of each element of a concrete structure with the same forming material or with such materials that produce a concrete surface that is uniform in texture, color, and appearance.
6. Clean the inside surface of forms of all dirt, mortar, and foreign material before concrete placement.
7. Use form oil that permits the ready release of the forms and does not discolor the concrete.
8. Do not place concrete in the forms until:
   a. All work connected with form construction has been completed.
   b. All embedded materials have been placed.
   c. All dirt, chips, sawdust, water, and other foreign materials have been removed.
   d. Inspection and approval have been obtained.
9. Do not use stay-in-place deck forms unless otherwise specified.

C. Footings
1. ~~Earthwork:~~Excavation: Refer to Section ~~02316.~~02317.
2. The Engineer may direct written changes in dimensions or elevations necessary to secure a satisfactory foundation.
3. Do not dewater by pumping during concrete placement, or for 24 hours thereafter, unless pumping is outside the enclosure. Do not use well points to dewater footing.

3.2 GIRDERS, SLABS, AND COLUMNS

A. Deck: Cure deck concrete at least ~~7~~seven days and until it has attained required design strength before placing parapet forms or leave all falsework in place and design it to carry all additional loads that are part of the parapet placement process.

~~A.~~B. Slab Span: Place concrete in one continuous operation.

~~B.~~C. Cast-In-Place T-Beams:
1. Place concrete in one or two continuous operations: The first to the top of the girder stems and the second to completion.
2. Obtain a bond between the stem and slab that is positive and mechanical, and secured by means of shear keys in the top of the girder stem.

~~C.~~D. Concrete in columns:
1. When column is being placed on a footing, allow footing concrete to set at least four days before placing column forms.

~~1.~~2. Place concrete in one continuous operation.
~~2.~~3. Allow concrete to set at least two days before placing caps.
~~3.~~4. Do not place concrete in the superstructure until the columns have been stripped and approved.

~~4. Do~~E. Substructure Concrete: Do not place the superstructure load on the bents ~~until it has been in place a minimum of 14 days.~~or abutments until they have been in place at least ~~7~~seven days and attained the required design strength.

~~D. Through-Girder Superstructures:~~

D. Through-Girder Superstructures:
~~1. Place concrete in one continuous operation unless otherwisespecified.~~ specified.
~~2. If otherwise specified, provide special shear anchorage to assure monolithic action between girder and deck.~~

3.3 BOX CULVERTS

A. Allow base slab and footing to cure for 24 hours before the remainder of the culvert is constructed.

B. Construct side walls and top slab monolithically unless the wall height exceeds 10 ft. Keep the construction joints vertical and at right angles to the axis of the culvert.

C. When side walls and top slab are not placed monolithically, construct shear keys in the top of the side walls for anchoring the top slab.

D. Construct wingwalls monolithically.

E. Do not backfill until concrete has been in place at least ~~7~~seven days and attained required strength.

3.4 CONCRETE SLOPE PROTECTION

A. Preparing subgrade:
1. Prepare the area to be paved by smoothing and shaping the berms and slopes and excavating for the cut-off walls.
2. Fill and compact all depressions and humps.
3. Furnish extra material to properly finish the slopes when required.
4. Compact all soft and yielding material resulting in a firm and substantial subgrade of uniform density.

5. Thoroughly sprinkle the area with water before placing the concrete.
6. Have the Engineer approve all surfaces before placing concrete.

B. Placing concrete:
1. Do not place concrete upon spongy, frozen, or unstable surfaces.
2. Provide concrete of a consistency that it can be placed on the slopes without deformation.
3. Complete all scoring as indicated on the plans.
4. Complete the entire ~~pavement~~slope protection in one placement if possible, or terminate the placement with a construction joint located in a scoring or at the junction of the slope and the abutment.
5. Finish ~~and cure~~ concrete using a Floated Surface ~~Finish. Refer to paragraph 3.11 and~~Finish according to this Section, ~~A~~article 3.11 ~~this Section~~. Cure according to Section 03390.

C. Sealing joints and closures:
1. Furnish 1-inch thick, rigid plastic foam (styrofoam) for all expansion joints located between structural members and the slope protection.
2. Place the rigid plastic foam material against the surface of all structural members before placing the concrete slope protection.
3. Anchor the rigid plastic foam in place with a compatible adhesive or other approved methods.
4. Seal this area just before final inspection.
5. Remove curing compounds, oil, grease, dirt, and any other foreign materials from concrete surfaces and grooves by sandblasting or other permitted methods.
6. Place the backer rod and sealant after the concrete has properly cured.
7. Apply the backer rod and sealant to clean and dry concrete surfaces.
8. Place sealant with hand or power-operated caulking guns after placing the backing materials. Refer to Section 03152.
   a. Limit the depth of sealant in the groove to 3/8 inch.
   b. Start the placement at one side and proceed to the other side on horizontal grooves and from top to bottom on vertical grooves.
   c. Use a concave pointing tool with soap solution to tool the sealant.
9. ~~9.~~ Do not place the sealant unless temperatures are at least 50 degrees F and rising.

D. Replacement
1. Prepare subgrade, place concrete and seal joints and closures per this Section, paragraphs~~Subsections~~ A, B and C ~~of this Article~~.
2. Place concrete slope protection within ~~7~~seven days after removing damaged concrete slope protection. Refer to Section 03055.
3. Connect reinforcement to existing concrete slope protection to remain in place as shown in the plans.
4. Use a sealant that meets the requirements in Section 03152.

3.5 PLACING CONCRETE

A. Do not place concrete without approval.

B. ~~A.~~ Remove struts, stays, and braces that hold the forms in correct shape and alignment when no longer necessary.

~~B. Mix and place~~C. Mix and transport concrete ~~within~~according to the limitations specified in Section 03055.

~~C.~~D. Do not deviate from the placement schedule without written approval.

~~D.~~E. If the concrete cannot be protected during adverse weather, the Engineer may postpone placement operations.

~~E.~~F. Observe the following precautions when handling concrete:

1. Avoid segregation of the ingredients.
2. Arrange chutes, troughs, or pipes used as aids in placing concrete so the concrete does not separate.
3. Use metal or metal-lined chutes and troughs. (Do not use aluminum.)
4. Equip chutes with baffle boards or a reversed section at the end of the outlet when placing on steep slopes.
5. Extend open troughs and chutes down inside the forms or through holes left in the forms; terminate the ends in vertical downspouts.
6. Thoroughly flush all chutes, troughs, and pipes with water before and after each placement.
7. Do not allow the free-fall of concrete to exceed 10 ft for thin walls (maximum 10 inch thickness) or 5 ft for other types of construction without the use of a tremie or a flexible metal spout.
8. Use flexible metal spout sections composed of conical sections not more than 3 ft long, with the diameter of the outlet and the taper of the various sections such that the concrete does fill the outlet and retards concrete flow.

~~F.~~G. Observe the following precautions when placing concrete:

1. Deposit concrete as close as possible to its final position, without allowing it to flow laterally in the form.
2. Spread fresh concrete in horizontal layers with thickness not greater than what can be compacted with vibrators.
3. Do not use vibrators to flow concrete laterally.
4. Limit placement interruptions to 45 minutes.
5. Place and compact each layer before the preceding layer has taken initial set.

6. Do not place concrete in water flowing under head within the area of a footing.
7. Pass the screed over the area with a screed face device to measure the cover before concrete placement.
8. Relocate and tie reinforcing steel that projects above the specified level before placing the concrete.
9. Raise and support reinforcing steel that is more than ~~1/4~~¼ -inch below the specified level before placing the concrete.
10. Firmly support screed rails for bridge deck slabs to prevent movement during concrete placement. When using a finishing machine, support the machine rails on the bridge beams. (Do not place the machine rails on the forms unless the form supports have been strengthened and the Engineer gives written approval.)

~~G.~~H. Observe the following precautions when compacting concrete:

1. Use high frequency internal vibrators to compact all concrete for structures (except concrete placed under water).
2. Supply enough vibrators to compact the fresh concrete to the desired degree within 15 minutes after it is deposited in the forms.
3. Supply at least two vibrators for structures involving more than 25 yd^3 ~~cubic yards~~ of concrete.
4. Do not attach vibrators to or against the forms or the reinforcing steel.
5. Do not allow vibrators to penetrate layers of concrete that have taken initial set.
6. Use spades or wedge-shaped tampers to secure a smooth and even texture of the exposed surface.

3.6 PLACING CONCRETE UNDER WATER

A. Place and deposit concrete under water when specified on the plans.

B. Seal the forms or cofferdams watertight.

C. Do not pump water while placing concrete or disturb the concrete until it has set at least 24 hours, or attained at least 50 percent of its design strength.

D. Regulate placing to keep surfaces approximately horizontal at all times.

E. Place the concrete by beginning at one end of the form and progressing in a zig-zag movement from side to side across the length of the form.

F. Place the concrete using a tremie or concrete pumping equipment.

G. Observe the following steps when placing concrete with a tremie:

1. Use an 8-inch to 12-inch diameter steel tube tremie constructed with watertight connections, a hopper to receive concrete, and a device at the bottom to exclude water from entering the tube.
2. Use support that permits the discharge end to move over the entire top work surface and permits the tremie to be rapidly lowered to stop or retard flow when necessary.
3. Minimize the number of tremie location shifts for continuous placement.
4. Keep the tremie tube full to the bottom of the hopper during placement.
5. Slightly raise the tremie when a batch is dumped into the hopper, but do not raise it out of the concrete at the bottom until the batch discharges to the bottom of the hopper. If the concrete seal around the tube is lost, re-plug the end and refill the tube with concrete.

3.7 PUMPING CONCRETE

A. Place concrete with a concrete pump in good operating condition. Replace pump that causes excessive or erratic loss of air entrainment.
   1. Use a pump that produces a continuous stream of concrete without air pockets.
   2. Do not add water to the concrete in the pump hopper.

B. Do not allow pump vibrations to damage freshly placed concrete.

C. Do not use concrete contaminated by the priming or cleaning of the pump.

3.8 LIMITATIONS

~~A. Place all concrete possible in daylight.~~

~~B.~~

~~B.~~A. If either mixing, placing, or finishing occurs after daylight hours, light the work site so all operations are plainly visible. Refer to Section 00555.

~~C.~~B. Keep all traffic off concrete bridges and culverts for ~~21~~14 days after final concrete placement.

~~D. Hot and Cold Weather Limitations: Refer to Section 03055.~~

C. Cold Weather:

1. Cold weather limitations apply when the temperature is likely to fall below 40 degrees F within 14 days of placement.

2. Comply with the following regulations for placing concrete in cold weather:
   a. Submit a written plan for approval 14 calendar days before concrete placement.(Note: If a submittal, is it in the Submittal article?)
   b. Do not use chemical additives in the concrete to prevent freezing.
   c. Provide all necessary cold weather protection for in-place concrete (cover, insulation, heat, etc.).
   d. Do not place concrete in contact with frozen surfaces.
   e. Produce concrete with a temperature between 60 degrees F and 90 degrees F at the time of placing.
   f. Adequately vent combustion-type heaters that produce carbon monoxide.
   g. Maintain the concrete temperature above 50 degrees F and below 120 degrees F with no more than a 40 degree F temperature gradient at any one time for the first 14 days after placing.
   h. Protect the concrete from freezing until a compressive strength of at least 3,500 psi has been achieved.
   i. Maintain moist conditions for exposed concrete not in contact with forms; avoid loss of moisture from the concrete due to heat applied.
   j. Limit the drop in temperature next to the concrete surfaces when removing heat to 20 degrees F during any 12-hour period until the surface temperature of the concrete reaches that of the atmosphere.
   k. Determine the concrete temperature with a surface thermometer insulated from surrounding air.
   l. Remove and replace concrete damaged by frost action at no additional cost to the Department.
3. Heating Aggregate and Water:
   a. Provide and operate heating devices at no additional cost to the Department when heated aggregates are required.
   b. Aggregates must be free of ice.
   c. Heat aggregates uniformly, when required. Avoid overheating or developing hot spots.
   d. Use either steam or dry heat.
   e. To avoid the possibility of a quick or flash set of the concrete when either the water or aggregates are heated to above 100 degrees F, they should be combined in the mixer first before the cement is added. If this mixer-loading sequence is followed, water temperatures up to the boiling point can be used provided the aggregates are cold enough to reduce the final temperature of the aggregates and water mixture to less than 100 degrees F.

D. Hot Weather: Cool all form surfaces that will come in contact with the concrete to below 95 degrees F.

E. Surface Evaporation:

1. Surface evaporation limitations apply and may occur at any time of the year, when any combination of air temperature, relative humidity, and wind velocity, that have the potential to impair the quality of fresh or hardened concrete or otherwise result in abnormal properties. Submit a written plan for approval 14 calendar days before concrete placement that shows proper attention will be given to ingredients, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures and water evaporation that could impair strength or serviceability of the concrete. Refer to ACI 305.

2. The surface evaporation plan may include any of the following actions:

a. Construct windbreaks or enclosures to effectively reduce the wind velocity throughout the area of placement.

b. Use fog sprayers upwind of the placement operations to effectively increase the relative humidity.

c. Reduce the temperature of the concrete by shading the material storage area or production equipment, cool aggregate by sprinkling, cool aggregate ~~and/~~or water by refrigeration or by replacing a portion or all of the mix water with flaked or crushed ice to the extent that the ice will completely melt during mixing of the concrete.

d. Adjustment of the placement schedule.

e. Use an approved water-based mono-molecular polymer liquid evaporative reducer at application rates recommended by the manufacturer. Do not use as a finishing aid.

3.9 EXPANSION JOINTS AND BEARINGS

A. ~~A. Refer~~For expansion joints, refer to Section 05832.

B. For bearings, refer to Section 05822.

~~B.~~C. Adjust bearing positions and joint widths as ~~directed when steel or concrete is installed at temperatures above 68 degrees F and below 50 degrees F.~~shown on plans.

3.10 CONSTRUCTION JOINTS

A. Make construction joints where shown on plans or in the placing schedule.

B. Obtain Engineer's written approval when additional construction joints are desired and meet the following requirements:

1. Place and construct without impairing strength and appearance.

2. Place in planes perpendicular to the principal lines of stress and at points of minimum shear.
3. Make monolithic structures by extending the reinforcing across the joint.
4. Avoid construction joints through paneled wing walls or large surfaces which are to be treated architecturally.
5. Make a straight line joint across the face of the pour for the full width of the bridge deck.
6. Leave a rough surface to increase the bond with the concrete placed later.
7. Form tapered sections with an insert so that the succeeding layer of concrete ends in a section at least 6 inches thick.
8. Place a bulkhead from the surface to the top mat of steel to ensure a straight vertical face. Shape the concrete below the top steel to a near vertical face in line with the bulkhead.
9. When a bulkhead cannot be placed, establish a straight vertical face by saw cutting to a minimum depth of 1 inch. Shape the concrete below the saw cut to a near vertical face.

C. Before resuming concrete placement, meet the following:
1. Re-tighten forms.
2. Roughen the surface of hardened concrete without leaving loosened particles or damaged concrete.
3. Clean off concrete surface of foreign matter and laitance by sandblasting.
4. Saturate concrete surface with water.
5. Apply epoxy adhesive as specified to face of construction joints.

3.11 CONCRETE SURFACE FINISHING CLASSIFICATIONS

A. Ordinary Surface Finish: A true and uniform finished surface.

B. Rubbed Finish: A surface smooth in texture and uniform in appearance, free of all form marks or irregularities.

C. Wire Brush or Scrubbed Finish:
1. A finished surface with the cement surface film completely removed and the aggregate particles exposed leaving an even-pebbled texture.
2. An appearance ranging from fine granite to coarse conglomerate depends on the size and grading of the aggregate used.

D. Floated Surface Finish:
1. For flat work: strike off and use a floated surface finish.
2. For bridge decks and approach slabs: machine finish only.

3.12 CONCRETE SURFACE FINISHING

A. Give all formed concrete surfaces at least an Ordinary Surface Finish except as specified otherwise.

B. Use other types of finishes as required in addition to the Ordinary Surface Finish.

C. Provide a Rubbed Finish for all surfaces that cannot meet Ordinary Surface Finish requirements due to irregularities, honeycombing, excessive surface voids, discoloration, and other defects.

3.13 CONCRETE SURFACE FINISHING PROCEDURES

A. Ordinary Surface Finish:
   1. After removing forms, remove all fins and projections.
      a. Clean, point, and true all honeycomb spots, broken corners or edges, cavities made by form ties, and other holes and defects.
      b. Keep all areas to receive mortar saturated with water for at least 30 minutes before mortar placement.
   2. For pointing, use a mortar of cement and fine aggregate, not more than 1 hour old, mixed in the proportions used in the grade of concrete being finished.
   3. Cure the mortar patches and rub to blend with surrounding concrete.
   4. Tool and free all joints of mortar and concrete. Leave the full length of the joint filler exposed with clean and true edges.

B. Rubbed Finish:
   1. Wet the surface of concrete while still green, paint with grout, and rub with a wooden float until the surface is covered with a lather of cement and water.
      a. A thin grout (1 part cement, 1 part fine sand) may be used in the rubbing.
      b. Let this lather set for at least ~~5~~ five days, then rub lightly with a fine carborundum stone until smooth.

2. For hardened concrete, use a mechanically operated carborundum stone to finish the surface at least 4four days after placing.
    a. Finish in the same manner as above; however, let the lather set for at least 15 days before lightly rubbing with a fine carborundum stone until smooth.
3. Commercial grade rubbing mortar may be used if approved by Engineer.

C. Wire Brush or Scrubbed Finish:
1. After the forms are removed and the concrete is green, scrub the surface with stiff wire or fiber brushes using a solution of muriatic acid (one part acid, four parts water).
2. Once the scrubbing produces the desired texture, wash the entire surface.
3. Use water mixed with 5 percent by volume ammonium hydroxide to remove all traces of the acid.

D. Floated Surface Finish on flat work other than bridge decks and approach slabs:
1. Striking Off:
    a. After compaction, carefully rod and strike off the surface with a strike board following the cross sections and grades shown on the plans.
    b. Allow for camber as required.
    c. Operate the strike board longitudinally or transversely and move it forward with a combined longitudinal and transverse motion, ensuring that neither end is raised from the side forms during the process.
    d. Keep a slight excess of concrete in front of the cutting edge at all times.
2. Floating:
    a. Use longitudinal, or transverse floating, or both to create a uniform surface.
    b. Longitudinal floating is required except in places where it is not feasible.
3. Longitudinal Floating:
    a. Work the longitudinal float, operated from foot bridges, with a sawing motion while holding it parallel to the road centerline.
    b. Pass gradually from one side of the pavement to the other. Move the float forward one-half of its length and repeat operation.
    c. Substitute machine floating, if equivalent results are produced.
4. Transverse Floating:
    a. Operate the transverse float across the concrete surface by starting at the edge and slowly moving to the center and back again to the edge.
    b. Move the float forward one-half of its length and repeat the operation.

c. Preserve the crown and cross section of the concrete surface.

5. Straightedging:
   a. Test the concrete surface for trueness with a straightedge after the longitudinal floating has been completed and the excess water has been removed, but while the concrete is still plastic.
   b. Furnish and use an accurate 10 ft straightedge held parallel to the road centerline in contact with the surface.
   c. Check the entire area, immediately filling depressions with freshly mixed concrete, then strike off, consolidate, and refinish.
   d. Cut down and refinish high areas.
   e. Continue the straightedge testing and re-floating until the concrete surface is at the required grade and contour.

E. Floated Surface Finish for bridge decks and approach slabs:
1. Machine-finish exposed surfaces unless otherwise permitted.
2. Finish concrete by striking off and floating the surface.
3. Allow the Engineer enough time to inspect finishing machines during daylight hours before concrete placement.
4. Stop finishing operations hampered by darkness unless lighting facilities are provided.
5. Extend finishing machine rails beyond both ends of the scheduled placement, and allow sufficient distance to permit the float to fully clear the concrete.
6. Use adjustable rails set to elevations established by the Engineer, installed to prevent springing or deflection under the weight of the finishing equipment, and placed to operate without interruption.
7. Place screed machine parallel to the abutments and bents within 10 degrees.
8. Support screed rails to prevent movement during placing of the concrete.
9. Either support finishing machine rails on the bridge beams or on form supports stiffened to prevent deflection.
   a. Obtain written approval before using form supports.
   b. This may require load tests.
10. Attach a measuring device to the screed face and pass it over the area.
11. Before placing concrete, relocate and tie reinforcing steel that projects above the specified level, and raise and support steel that is more than 1/4 inch below the specified level.
12. Place concrete in a uniform heading approximately parallel to the screed machine.
13. Limit the rate of placing to allow enough time to finish the surface before initial set.
14. Continuously place concrete the full length of the structure or superstructure unit unless otherwise shown or approved.
15. Provide sufficient material, equipment, and manpower to place deck concrete at a minimum rate of 25 yd^3~~cubic yards~~ per hour.

16. Strike off the surface to the required elevations with the finishing machine immediately after placing and consolidating the concrete.
17. Do not add water to the concrete in front of or behind the screed.
18. Have the strike-off method and equipment approved. Maintain satisfactory performance. Use equipment capable of finishing concrete within the surface tolerances specified. Maintain satisfactory consolidation and surface tolerance to prevent shutdown and rejection of the equipment.
19. Furnish a 10 ft straightedge to check the surface tolerance, placed both longitudinally and transversely, immediately behind the screed machine and hand-finished areas.
20. Correct irregularities greater than $^{1}/_{8}$ inch from the straightedge, before additional placement, and immediately fill depressions with concrete, and refinish.
21. Cut down and refinish high areas.
22. Continue straightedge testing and corrective measures until the entire surface is free of observable departures from the straightedge.

F. Final texturing for bridge decks and approach slabs: (a textured hardened finish):
1. After floating, do not texture finish concrete deck surfaces that are to be covered by a water-proofing membrane system.
2. Use a texture process that produces regular ~~1/8~~ $^{1}/_{8}$ inch wide transverse grooves spaced randomly from ~~1/2~~½ inch to ~~3/4~~¾ inch on centers and ~~1/8~~ $^{1}/_{8}$ inch deep.
3. Keep the finished surface free from porous spots and surface irregularities.
4. Furnish a work bridge that follows the finishing machine to facilitate texturing and application of the membrane-curing compound.
5. Check the surface smoothness for acceptance after the concrete has hardened.
6. If the surface deviates more than ~~1/8~~ $^{1}/_{8}$ inch from a 10 ft straightedge, remove irregularities by grinding following Section 02752.

3.14 CURING ~~STRUCTURES~~

A. Refer to Section 03390.

3.15 FORM REMOVAL

A. Obtain approval before removing forms.

B. Remove all forms from the concrete surfaces.

C. Do not use any method of form removal likely to cause overstressing of the concrete.

D. Remove supports to permit the concrete to uniformly and gradually take the stresses due to its own weight.

E. Do not remove forms used in ornamental work, railings, parapets, and exposed vertical surfaces for at least six hours after placement.

F. To determine the condition of columns, always remove forms before removing shoring from beneath beams and girders.

G. Removing falsework:

1. Do not remove deck falsework until the backfill at the abutments ~~have~~has been placed up to the bottom of the approach slab.
2. Do not remove falsework supporting the deck of rigid frame structures until the fill has been placed in back of the vertical legs.
3. Keep falsework and forms in place under slabs, beams, and girders for 14 days after the day of last concrete placement. Forms for slabs having clear space of less than 10 ft may be removed after seven days.
4. In cold weather, keep forms and falsework in place as approved in the written plan for cold weather concrete.

H. Patch formed surfaces within 24 hours after form removal:

1. Cut back and remove all projecting wire or metal devices used for holding the forms in place and that pass through the body of the concrete at least 1 inch beneath the surface of the concrete.
2. Remove lips of mortar and all irregularities caused by form joints.
3. Fill all small holes, depressions, and voids with cement mortar mixed in the same proportions as that used in the body of the work.
4. To patch larger holes or honeycombs, obtain a solid uniform surface by chipping away coarse or broken material.

~~5.~~a. Cut away feathered edges to form faces perpendicular to the surface.

~~6.~~b. Cover with epoxy-adhesive coating as specified. AASHTO M 235, Type II

~~7.~~c. Fill the cavity with stiff mortar composed of one part Portland Cement to two parts sand thoroughly tamped into place.

~~8.~~d. Pre-shrink the mortar by mixing it approximately 20 minutes. Vary the time according to manufacturer's recommendations, temperature, humidity, and other local conditions.

~~9.~~e. Float the surface of this mortar with a wooden float before initial set.

~~10.~~f. Keep the patch wet for five days.

~~11.~~g. After curing, rub patches on exposed surfaces to blend them with surrounding concrete.

~~12.~~h. Add coarse aggregate to the patching material when patching large or deep areas.

~~13.~~i. Make a dense, well-bonded, and properly cured patch.

I. Areas with ~~honeycomb~~extensive honeycombing will be rejected. After receiving written notice of rejection, remove and rebuild the structure in part or wholly, as specified, at no additional cost to the Department.

J. If the Contractor elects to place inserts along the bottom edges of the precast concrete deck panels to form the closure pour joints, apply the following requirements after fully removing all the closure joint forms:

1. Cut off cast-in-place anchors at least 1inch below the face of slab and repair per this Section, ~~A~~article 2.2.
2. Fill all voids with dry-pack mortar flush with the bottom of slab.
3. Fill voids created by the removal of re-usable concrete anchors with dry-pack mortar flush with the bottom of slab.
4. Dry-pack mortar will be composed of 1 part Portland cement to 2 parts sand.

3.16 MISCELLANEOUS CONSTRUCTION

A. Drainage and weep holes:

1. Construct drainage and weep holes at locations indicated on the plans or as directed.
2. Place ports or vents for equalizing hydrostatic pressure below low water.
3. Use non-corrosive materials for weep hole forms.
4. Remove wooden forms after the concrete is placed.
5. Paint exposed surfaces of metal drains as indicated on the plans.

B. Anchor Bolts: Securely and accurately set all necessary anchor bolts in piers, abutments, or pedestals as the concrete is being placed.

C. Bearing plate areas:

1. Finish bridge seat bearing areas high and rub or grind to grade level within an allowable tolerance of ~~within a tolerance of ±1/16 inch.~~of±~~1/16~~ $^{1}/_{16}$ inch within a tolerance of ± ~~1/8~~ $^{1}/_{8}$ inch of the elevation shown on the plans.
2. Do not grout under bearing plates.

3.17 CLEANING

A. Clean up by removing all falsework and falsework piling, (down to 2 ft below the finished ground line) rubbish, and temporary building materials before final inspection.

END OF SECTION

Standards Committee Submittal Sheet

Name of preparer: John Leonard
Title/Position of preparer: Traffic and Safety Operations Engineer
Specification/Drawing/Item Title: Traffic Control Drawings
Specification/Drawing Number: TC-4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

Review of existing TC Series Drawings. Drawings have been modified as required to bring into conformance with the MUTCD, the Roadside Design Guide, and Department practice. Provided as a separate attachment is a detailed description of changes made to each sheet.

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

Existing

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below. Indicate if no comments were received.

Note: There is a two-week response time set for this item.

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)

No Comments
Attached in Comment Resolution document.

ACEC Comments: (Use as much space as necessary.)

No Comments
Attached in Comment Resolution document.

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

List of all individuals attached.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)

All Project Managers, all Preconstruction Engineers, all Traffic Engineers, all Risk Management, all Maintenance Engineers, all Area Supervisors, all Permits officers, all Region and District Directors, and all members of the Standards Committee.

Construction Engineers

All Construction Engineers, Central Construction, and REs

Contractors (Any additional contacts beyond “C” above.)

None

Suppliers

None

Consultants (as required) (Any additional contacts beyond “C” above.)

None

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

Anthony Sarahan. Roland Stanger has been a partner throughout the review process.

Others (as appropriate)

None

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)

   None

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)

   None

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

   None

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.

   None

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).

   None

3. Life cycle cost.

   None

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)

Compliance with the MUTCD and safer operating practices.

H. Safety Impacts?

Compliance with the MUTCD and safer operating practices.

I. History? Address issues relating to the current usage of the item and past reviews, approvals, and/or disapprovals.

Integral part of all projects, maintenance operations, and permitted operations.

Priority Explanation

Enter the appropriate priority in the box on the first page of the document.

Priority 1 Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.

Priority 2 Upon posting, this impacts projects being advertised.

Priority 3 Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

Review Comments Form

Item No.	Reviewer	Sheet/Section No.	Comment	Review Mtg. Action	Final Action.
1	Todd Richins, R-2 Maint.	TC-8	**John,** **Thank you for sending this information out for us to review. I do have one question for you on TC 8, "requiring drums on high speed roads".** **Is that requirement just in the taper, or through out the whole lane closure? In our rural interstate areas during day light hours, we (maintenance) have drums in our tapers and usually use cones through out the rest of the lane closures, will this be acceptable?** **Down here in the city, we only use cones on secondary roads occasionally, so I see no concern.** **Thank's, Todd Richins**	B	C
			Response: Barrels are only required in Taper as per Note 1. This is one of the proposed changes. Previously, barrels were required for all devices at speeds of 50 mph and greater.		
2	Patrock McGann, R-4 (Price) Maint.	TC-4	**On TC 4, Item 7 "Added barricades to closed lanes/work space" the drawing of the barricade is confusing and doesn't specify what type of barricade.** **I have no comments on TC 5 through TC 15.**	B	C
			Response: The barricades added to the workspace were Type IIIs to prevent intrusion into the work area. This is shown on the call out for each location by an icon, which is referenced in Note 5, which refers to STD DWG TC 3A for Traffic Control Device Legend.		
3	Lyndon Friant, R-4 Preconst	All	**My only questions are these, Why did you change the circles to boxes to distinguish from taper and tangent devices? On some drawings boxes are shown in the tapers and others show circles for tapers, why? I didn't see a problem staying with the same shape for tangents and tapers. These are my comments. I can live with whatever changes are made. Thanks for your good work. LF.**	B	C

Action Code	A	B	C	D
	Submitter will Comply	**Submitter to Evaluate**	**Delete Comment**	**Others to Evaluate**

Item No.	Reviewer	Sheet/Section No.	Comment	Review Mtg. Action	Final Action.
			Response: As per TC 3A, square boxes represent any traffic control device, and circles represent plastic drums or directional indicator barricades. Based on speed, some traffic control setups have both types of devices in the traffic control plan. This legend is also in compliance with the MUTCD.		
4	Scott Nussbaum, R-1	All	**John,** **A very cursory review revealed no concerns, other than I wasn't able to verify the references to the updated TC 1 through TC 3D drawings, as those recent drawings had not been posted to the web, as far as I can tell.** **With Regards,** **Scott**	B	C
			Response: TC 1 to 3D were dated April 26, 2007, and issued May 10, 2007. A review indicates references are correct.		
5	Bill Lawrence, R-2, Preconst.	General	**No comments.**	A	A
			Response:		
6	Joe Kammerer, R-2, PM	General	**No comments.**	A	A
			Response:		
7	Barry Sawsak, R-3 ROW	General	**No comments.**	A	A
			Response:		
8	Steve Bonner, R-3 Risk Management	General	**No comments.**	A	A
			Response:		
9	Robert Westover, R-3	General	**No comments.**	A	A
			Response:		
10	Danny Webster, R-4 (Cedar) Risk Management	General	**No comments.**	A	A
			Response:		
11	Mike Miles, R-4 PM	General	**No comments.**	A	A
			Response:		
12	Nathan	General	**No comments.**	A	A

Action Code	A	B	C	D
	Submitter will Comply	**Submitter to Evaluate**	**Delete Comment**	**Others to Evaluate**

STD DWG/Spec Number	**TC 4 to TC 16**	Sheet 3	of	3
Date:	June 2007	Facilitator:	John Leonard	

Item No.	Reviewer	Sheet/Section No.	Comment	Review Mtg. Action	Final Action.
	Peterson, R-1 Preconst.		Response:		
13	Cameron Kergaye, R-2 PM	General	**No comments.**	A	A
			Response:		
14	Brent Schvaneveldt, R-3 PM	General	**No comments.**	A	A
			Response:		
15	Justin Sceili, Statewide Permits	General	**No comments.**	A	A
			Response:		
16	Robert Markle, R-3 Traffic	General	**No comments.**	A	A
			Response:		
17	Tyler Yorgason, ACEC	General	**No comments.**	A	A
			Response:		
18	Mont Wilson, AGC	General	**Called when no written response. Mont returned call and indicated that he saw no issues that would affect the AGC members at this time.**	A	A
			Response:		

Action Code	A	B	C	D
	Submitter will Comply	**Submitter to Evaluate**	**Delete Comment**	**Others to Evaluate**

General Summary of Proposed Revisions to TC 4 through TC 16

TC 4:

1. Changed icons for channelization devices and direction of travel to match common usage.
2. Revised signs to match the current MUTCD.
3. Cleaned up drawing (removed icons in crosswalk, size of icons)
4. Revised proportionality of drawing.
5. Clarified location of ‘Keep Right’ signs.
6. Added notes 6 through 9.
7. Added Type III barricades to closed lanes/work space

TC 5: Propose to delete

1. Covered in TA 33 of the MUTCD.

TC 6:

1. Changed icons for channelization devices and direction of travel to match common usage.
2. Revised signs to match the current MUTCD.
3. Revised proportionality of drawing.
4. Split Note 3 into two Notes.
5. Changed Note 6 to comply with ADA requirements
6. Added Notes 8, 9, and 14 for ADA compliance.

TC 7:

1. Changed icons for channelization devices and direction of travel to match common usage.
2. Revised signs to match the current MUTCD.
3. Revised proportionality of drawing.
4. Added Chevron Panels on reverse curve
5. Revised Notes
    a. Duplicate Notes for Details are now General Notes
    b. Specific Notes apply to the individual Detail
6. Added Note for use of ‘Pass With Care’ sign
7. Modified Title of Details
8. Modified Arrow Panel location

TC 8:

1. Changed icons for channelization devices and direction of travel to match common usage.
2. Revised signs to match the current MUTCD.
3. Revised proportionality of drawing.
4. Modified titles of Details
5. Revised Notes
    a. Duplicate Notes for Details are now General Notes
    b. Specific Notes apply to the individual Detail

6. Note 1 revised to provide drums for lane closure devices on high-speed roads. Previous Note required all devices on a high-speed road to be drums.
7. Modified Arrow Panel location.

TC 9: Propose to delete

1. Covered in TA 38 of the MUTCD

TC 10:

1. Changed icons for channelization devices and direction of travel to match common usage.
2. Revised signs to match the current MUTCD.
3. Added 'Road Work Ahead' sign for Detail 10-1 left side
4. Added new Note on location of Advance Warning Arrow Panel
5. Combined Notes 2 and 3
6. Added Note on signing haul road when not in use

TC 11:

1. Changed icons for channelization devices and direction of travel to match common usage.
2. Cleaned up sheet details for readability
3. Added Note 4 not requiring channelizing devices when right shoulder pavement width is adequate
4. Changed taper on exit ramp from L/2 to L to match MUTCD requirements on Detail TC11-2
5. Removed dimension of 400' on exit ramp.

TC 12:

1. Changed icons for channelization devices and direction of travel to match common usage.
2. Cleaned up sheet details for readability
3. Added Notes 3 and 4 providing design speed guidance
4. Added Note 5 not requiring channelizing devices when right shoulder pavement width is adequate
5. Added Note 6 on supplemental left side signing for multi-lane ramps
6. Changed taper on entrance ramp from L/2 to L to match MUTCD requirements on Detail TC12-2.

TC 13:

1. Changed icons for channelization devices and direction of travel to match common usage.
2. Added 'Pass With Care' sign and Note 6
3. Combined notes from both details into General Notes
4. Clarified paint requirements for no-passing zones
5. Referenced Project Limit signing
6. Clarified distances from 'Road Work Ahead' sign in Detail 13-1
7. Added Note 4 on barricading haul road when not in use

TC 14:

1. Changed icons for channelization devices and direction of travel to match common usage.
2. Revised signs to match the current MUTCD.
3. Added Note on Project Limit signing
4. Added One-Way sign on Detail 14-2
5. Added ‘Pilot Car Follow Me’ detail to Detail 14-3
6. Clarified location of flaggers on side street all Details
7. Placed signs on Detail 14-1 for uniformity of details
8. Modified Arrow Panel location
9. ‘Be Prepared to Stop’ sign made optional

TC 15:

1. Changed icons for channelization devices and direction of travel to match common usage.
2. Revised signs to match the current MUTCD
3. Added Note 5 on ‘Pass With Care’
4. Added Note 11 on ‘Fines Doubled’ signing
5. Added Note 12 on Project Limit signing
6. Added ‘Pilot Car Follow Me’ detail to Detail 15-3
7. Clarified location of flaggers on side street all Details
8. Modified length of pilot car turn-a-round area, Detail 15-2
9. Modified length of taper, Detail 15-2
10. ‘Be Prepared to Stop’ sign made optional, Detail 15-2

TC 16:

1. Changed icons for channelization devices and direction of travel to match common usage.
2. Clarified ‘Warning Mode’ to ‘Flashing Caution Mode’

Mail Envelope Properties (4654D800.25E : 156 : 5649)

Subject: Request for Comments, Proposed Revisions to Std Dwgs TC 4 through TC 16
Creation Date Wednesday, May 23, 2007 6:10 PM
From: JOHN LEONARD

Created By: JLEONARD@utah.gov

Recipients	**Action**	**Date & Time**
SRCOPO1.SRDOMAIN	Delivered	05/23/07 6:10 PM
MBCUTHBERT (Michael Cuthbert)	Opened	05/23/07 6:40 PM
	Deleted	06/08/07 10:21 AM
MKACZOROWSKI (Michael Kaczorowski)	Opened	05/24/07 8:01 AM
SRTCPO1.SRDOMAIN	Delivered	05/23/07 6:10 PM
ERASBAND (Eric Rasband)	Opened	05/24/07 6:26 AM
	Deleted	05/30/07 3:34 PM
civilscience.com	Transferred	05/23/07 6:11 PM
tyorgason (Tyler Yorgason)		
dot.gov	Transferred	05/23/07 6:12 PM
anthony.sarhan (Anthony Sarhan)		
Roland.Stanger CC (Roland Stanger)		
gcinc.com	Transferred	05/23/07 6:11 PM
mont.wilson (Mont Wilson)		
utah.gov		
SRCOPO1.SRDOMAIN	Delivered	05/23/07 6:10 PM
BAXELROD CC (Barry Axelrod)	Opened	05/24/07 6:24 AM
BWHEELER (Boyd Wheeler)	Opened	05/23/07 6:42 PM
DGIANNONATTI CC (Darrell Giannonatti)		
GOVARD CC (Garr Ovard)	Opened	05/24/07 10:05 AM
GSCHULTE (Glenn Schulte)	Opened	05/24/07 6:31 AM
JLEONARD (John Leonard)	Opened	05/23/07 6:11 PM
JSCEILI (Justin Sceili)	Opened	05/23/07 7:41 PM
	Replied	05/31/07 11:45 AM
	Emptied	05/31/07 11:45 AM
LMONTOYA (Larry Montoya)	Opened	05/24/07 9:45 AM
LYNNBERNHARD CC (Lynn Bernhard)	Opened	05/24/07 10:30 AM
MDONIVAN (Mike Donivan)	Replied	05/23/07 6:10 PM
	Opened	05/29/07 7:38 AM
PNEGUS CC (Peter Negus)	Opened	05/24/07 8:01 AM

RHULL (Robert Hull)	Opened	05/23/07 10:55 PM
	Deleted	06/08/07 1:10 PM
RICHARDCLARKE (Richard Clarke)	Opened	06/01/07 9:31 AM
RLINDSEY (Rukhsana Lindsey)	Downloaded	05/25/07 1:17 PM
	Opened	05/25/07 1:20 PM
ROBERTMILES CC (Robert Miles)	Opened	05/24/07 7:12 AM
SBURNS (Stan Burns)	Opened	05/29/07 7:36 AM
	Deleted	05/29/07 7:37 AM
STANADAMS CC (Stan Adams)	Opened	05/24/07 1:39 PM
TBIEL (Tim Biel)	Opened	05/23/07 8:23 PM
WGRAMES CC (Warren Grames)	Opened	05/24/07 7:48 AM
WSJONES (W. Scott Jones)	Opened	05/29/07 8:06 AM
utah.gov		
SRR1PO1.SRDOMAIN	Delivered	05/23/07 6:12 PM
BHUMPHREYS (Brad Humphreys)	Opened	05/24/07 4:41 AM
BILLGOOCH (Bill Gooch)	Undeliverable	05/23/07 6:11 PM
BILLSMITH (Bill Smith)	Opened	05/24/07 6:15 AM
	Deleted	05/30/07 1:55 PM
	Emptied	06/07/07 3:25 PM
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CMACE (Charles Mace)	Opened	05/24/07 11:31 AM
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utah.gov		
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DWEESE (Dottie Weese)	Opened	05/29/07 7:25 AM
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LWILSON (Lisa Wilson)	Opened	05/23/07 9:46 PM
MFARAH (Marwan Farah)	Opened	05/24/07 7:15 AM
MICHELLEPAGE (Michelle Page)	Opened	05/23/07 7:34 PM
MVELASQUEZ (Mark Velasquez)	Opened	05/24/07 7:27 AM
PTANG (Peter Tang)	Opened	05/24/07 10:28 AM
RDEBBAN (Rick Debban)	Opened	05/24/07 7:48 AM
RITCHIETAYLOR (Ritchie Taylor)	Opened	05/24/07 7:42 AM
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DNAZARE CC (David Nazare)	Opened	05/24/07 7:30 AM
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ERHOADES (Ervan Rhoades)	Opened	05/25/07 8:08 PM
GSEARLE (Greg Searle)	Opened	05/24/07 6:46 AM
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CARLJ (Carl Johnson)	Opened	05/24/07 8:07 AM
CLARKMACKAY (Clark Mackay)	Opened	05/29/07 9:01 AM
DBABCOCK (Dave Babcock)	Opened	05/24/07 7:40 AM
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DFRIANT (Daryl Friant)	Opened	05/29/07 7:44 AM
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GLEIGHTON (George Leighton)	Opened	05/24/07 10:54 AM
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	Emptied	06/06/07 6:59 AM
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JMCCONNELL (Jim McConnell)	Opened	05/24/07 4:31 PM
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utah.gov		
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DKINNECOM (Dave Kinnecom)		
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utah.gov	Transferred	05/23/07 6:11 PM
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utah.gov		
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EVANSULLIVAN (Evan Sullivan)	Opened	05/24/07 11:08 AM

Post Office	**Delivered**	**Route**
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SRTCPO1.SRDOMAIN	05/23/07 6:10 PM	
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		dot.gov
		gcinc.com
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Files	Size	Date & Time
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TC 4 to 16 Drafts for Review 5-21-07.pdf	4678375	Tuesday, May 22, 2007 3:36 PM
TC 4-16 Summary of Changes 5-21-07.pdf	10646	Wednesday, May 23, 2007 5:42 PM

Options

Auto Delete:	No
Expiration Date:	None
Notify Recipients:	Yes
Priority:	Standard
ReplyRequested:	Wednesday, June 06, 2007
Return Notification:	
Send Notification when Opened	
Send Notification when Deleted	
Concealed Subject:	No
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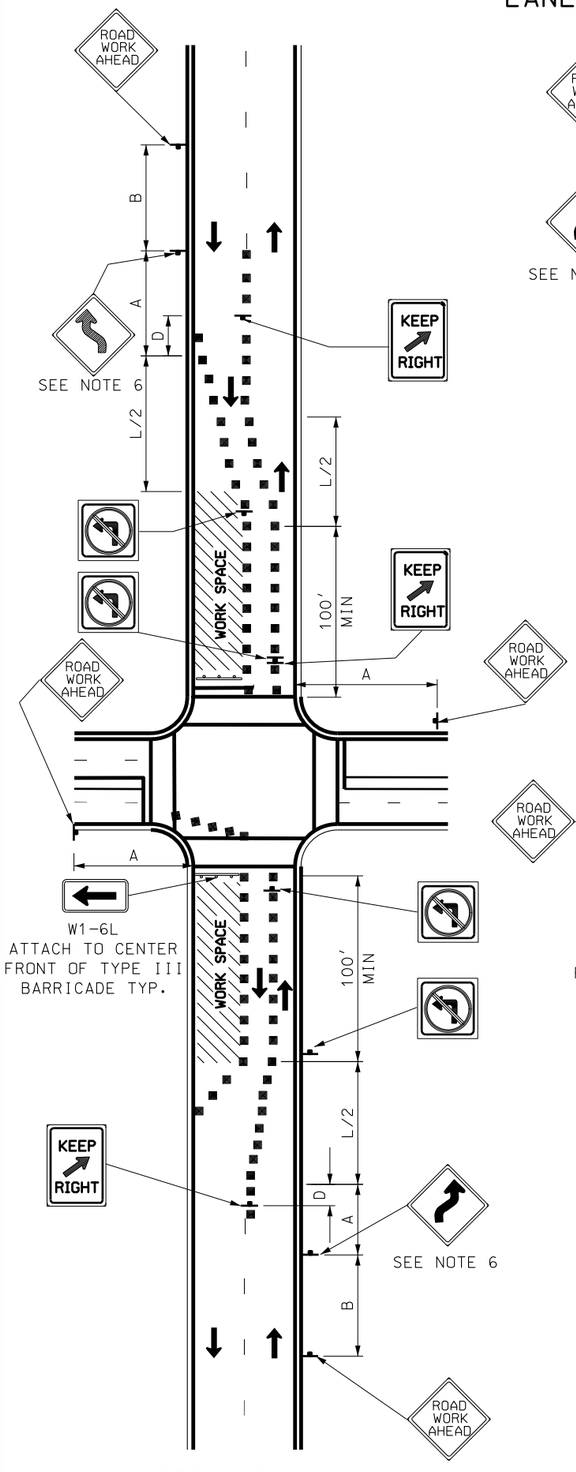
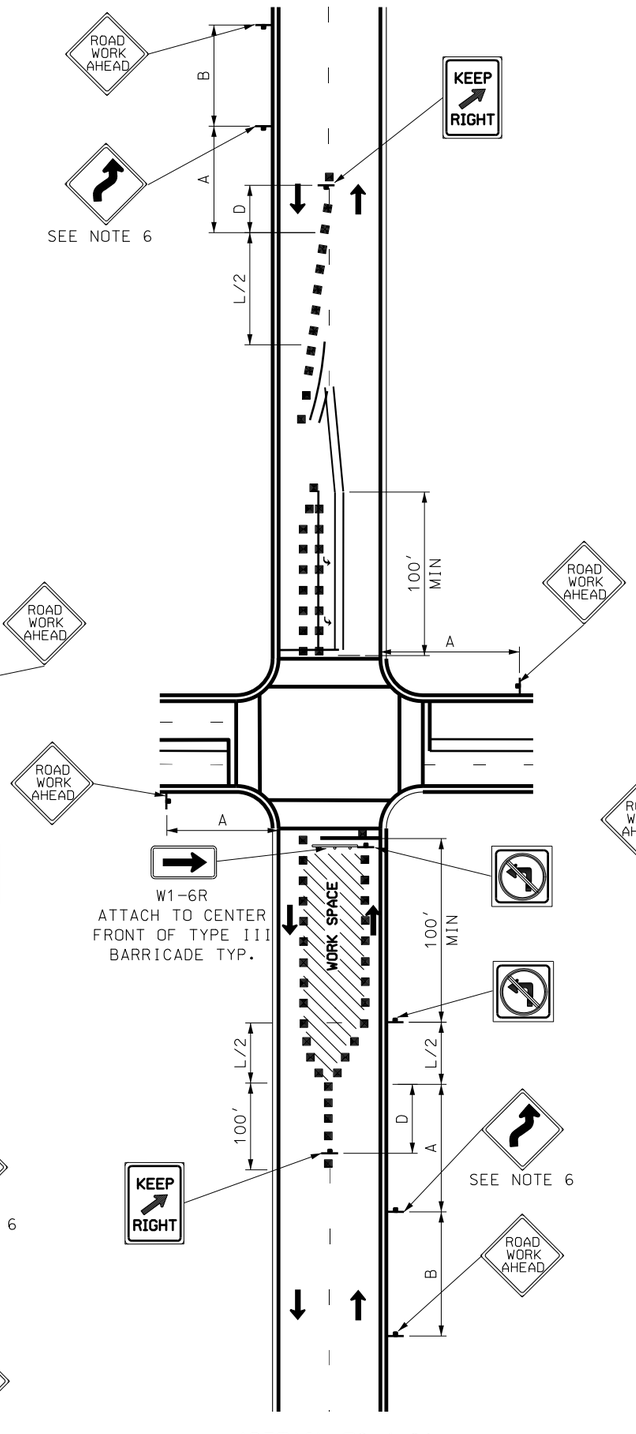
To Be Delivered:	Immediate
Status Tracking:	All Information

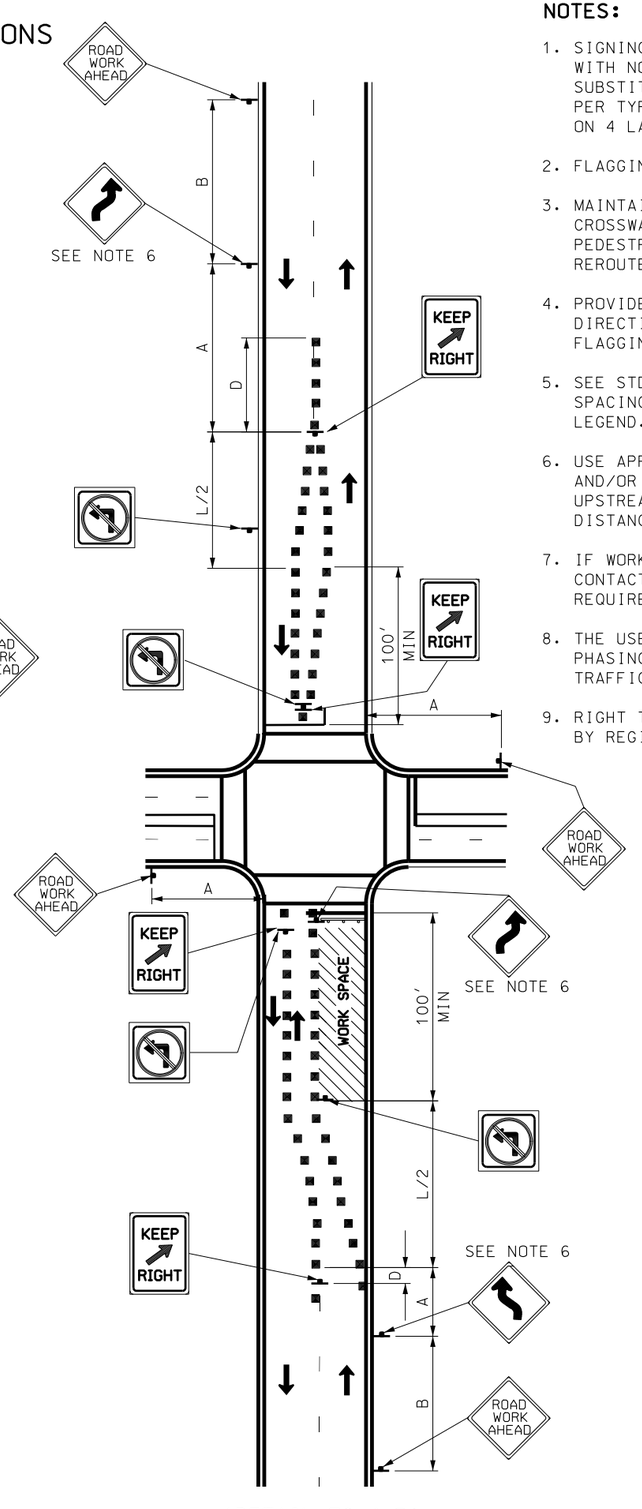
LANE SHIFT FOR URBAN INTERSECTIONS



(DETAIL TC 4-1)



(DETAIL TC 4-2)



(DETAIL TC 4-3)

NOTES:

1. SIGNING AND DEVICES SHOWN FOR 2 LANE ROADWAY WITH NO REDUCTION IN NUMBER OF LANES. SUBSTITUTE ADVANCE SIGNING AND DEVICES AS PER TYPICAL LANE CLOSURE. FOR LANE REDUCTION ON 4 LANES OR GREATER SEE STD DWG TC 8
2. FLAGGING IS OPTIONAL WITH LANE CLOSURE.
3. MAINTAIN PEDESTRIAN TRAFFIC AT EXISTING CROSSWALKS AND ON EXISTING SIDEWALKS. WHEN PEDESTRIAN TRAFFIC CANNOT BE MAINTAINED REROUTE ACCORDING TO STD DWG TC 6.
4. PROVIDE A MINIMUM 10' TRAFFIC LANE IN EACH DIRECTION. IF THIS CANNOT BE DONE USE A FLAGGING OPERATION AS PER STD DWG TC 14
5. SEE STD DWG TC 3A FOR TAPER, BUFFER, SIGN SPACING CHART AND TRAFFIC CONTROL DEVICE LEGEND.
6. USE APPROPRIATE SIGN SERIES (W1-3, W1-4, AND/OR W24-1 SERIES) BASED UPON THE UPSTREAM SPEED LIMIT AND/OR THE TANGENT DISTANCE BETWEEN CURVES.
7. IF WORKING IN A SIGNALIZED INTERSECTION CONTACT REGION TRAFFIC ENGINEER FOR REQUIREMENTS FOR DETERMINING SIGNAL NEEDS.
8. THE USE OF LEFT TURNS UNDER SPLIT SIGNAL PHASING REQUIRES APPROVAL OF THE REGION TRAFFIC ENGINEER.
9. RIGHT TURNS MAY BE PROHIBITED WHEN APPROVED BY REGION TRAFFIC ENGINEER.

REVISIONS			
NO.	DATE	APPR.	REMARKS

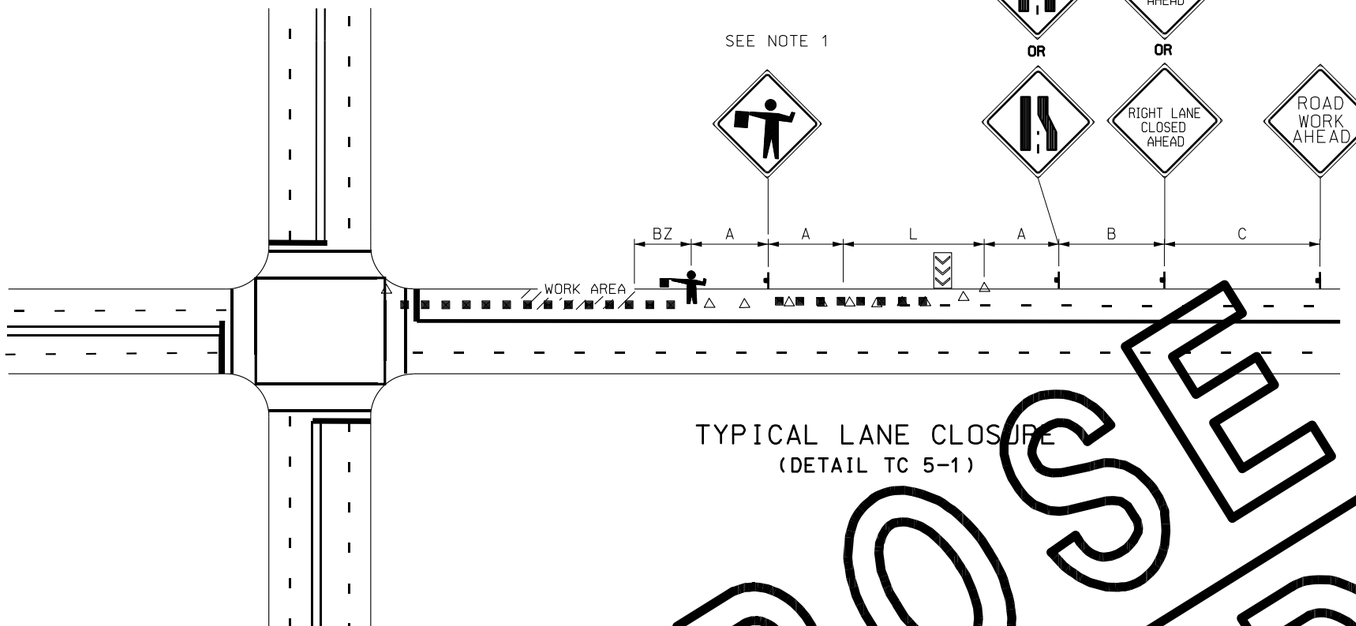
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JUN.28,2007 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — JUN.28,2007 DATE
DEPUTY DIRECTOR

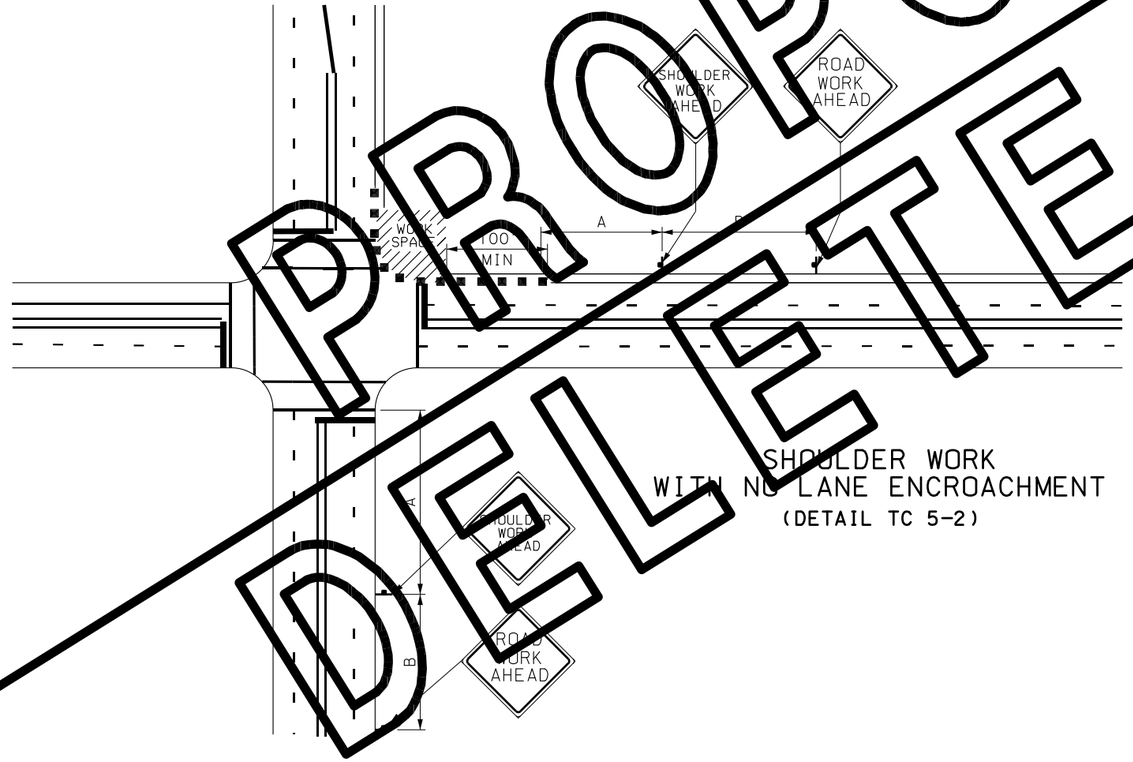
TRAFFIC CONTROL URBAN INTERSECTION WITH ROADWAYS UNDER 50 MPH

STANDARD DRAWING TITLE

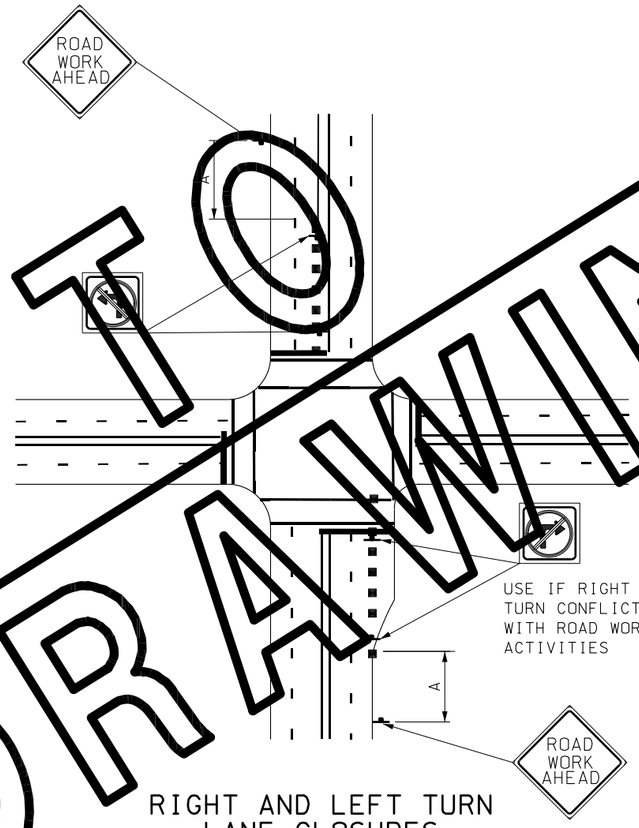
STD DWG
TC 4



TYPICAL LANE CLOSURE
(DETAIL TC 5-1)



SHOULDER WORK
WITH NO LANE ENCROACHMENT
(DETAIL TC 5-2)



RIGHT AND LEFT TURN
LANE CLOSURES
(DETAIL TC 5-3)

NOTES:

1. FLAGGING IS OPTIONAL WITH LANE CLOSURE.
2. MAINTAIN PEDESTRIAN TRAFFIC AT EXISTING CROSSWALKS AND ON EXISTING SIDEWALKS. WHEN PEDESTRIAN TRAFFIC CANNOT BE MAINTAINED REROUTE ACCORDING TO STD DWG TC 6.
3. PROVIDE A MINIMUM 10' TRAFFIC LANE IN EACH DIRECTION. IF THIS CANNOT BE DONE USE A FLAGGING OPERATION AS PER STD DWG TC 14.
4. SEE STD DWG TC 3A AND 3B FOR TAPER, BUFFER, AND SIGN SPACING CHART.

REVISIONS

NO.	DATE	APPR.	REMARKS

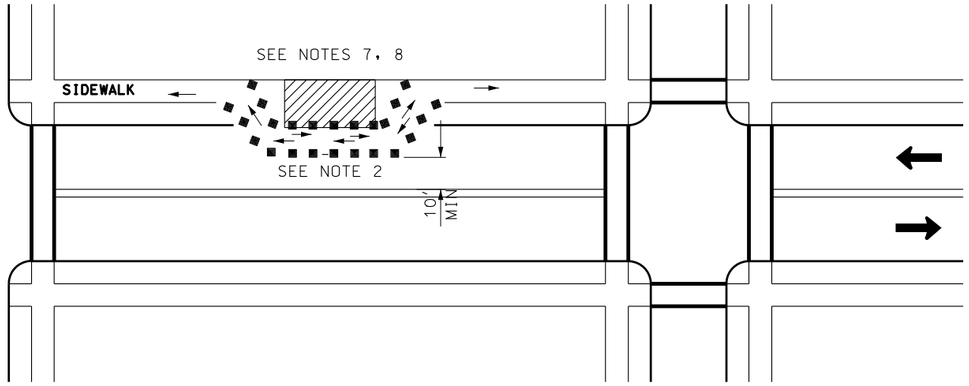
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — FEB.23,2006 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — FEB.23,2006 DATE
DEPUTY DIRECTOR

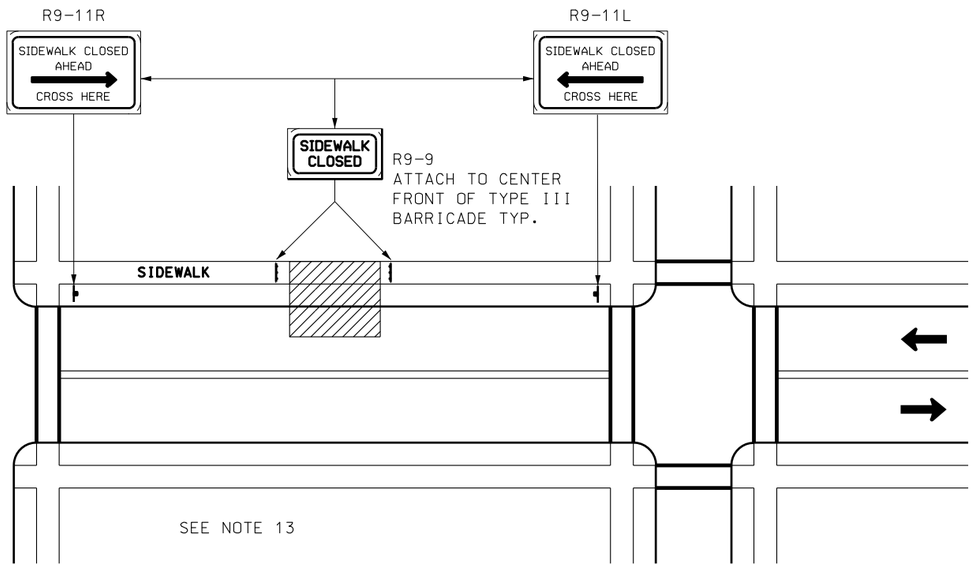
TRAFFIC CONTROL URBAN INTERSECTION WITH ROADWAY UNDER 50 MPH

STANDARD DRAWING TITLE

STD DWG
TC 5



TEMPORARY WALKWAY
(DETAIL TC 6-1)
SEE NOTE 1



ALTERNATE ROUTE
(DETAIL TC 6-2)
SEE NOTE 1

NOTES:

1. ONLY THE TRAFFIC CONTROL DEVICES CONTROLLING PEDESTRIAN FLOWS ARE SHOWN. OTHER DEVICES ARE NEEDED TO CONTROL TRAFFIC ON THE STREET. USE LANE CLOSURE SIGNING OR ROAD NARROWS SIGNS, AS NEEDED.
2. PROVIDE A TEMPORARY WALKWAY A MINIMUM OF 48" WIDE AROUND THE THE WORK SPACE IF WALKWAY IS CLOSED TO PEDESTRIANS. MAINTAIN A MINIMUM TRAVELED WAY WIDTH OF 10 FEET. IF THIS MINIMUM IS NOT ACHIEVED, THEN PROVIDE LANE SHIFTS, LANE CLOSURES, OR ENCROACH INTO OPPOSITE DIRECTION OF TRAFFIC AS PER STD DWG TC 8.
3. IF WALKWAY CANNOT BE PROVIDED DIRECT PEDESTRIANS TO ALTERNATE ROUTES. (SEE DETAIL TC 6-2)
4. COVER THE TEMPORARY WALKWAY WHEN POTENTIAL OF FALLING MATERIAL EXISTS.
5. CONSTRUCT TEMPORARY WALKWAY WITH A WOOD FLOOR OR PAVED SURFACE SO THAT IT IS TRAVERSABLE BY A WHEELCHAIR.
6. WHEN SIDEWALKS EXIST ON BOTH SIDES OF STREET COMPLETE WORK ON ONE SIDE AND REOPEN PRIOR TO STARTING WORK ON THE OTHER SIDE.
7. MOUNT SIGNS ON BARRICADE OR 7' MINIMUM HEIGHT ABOVE SIDEWALK.
8. PROVIDE DETECTABLE EDGING THE LENGTH OF THE TEMPORARY WALKWAY, EXCEPT WHERE GAPS ARE REQUIRED FOR PEDESTRIAN OR VEHICLE MOVEMENTS. THE EDGING SHOULD BE AT LEAST 6 INCHES ABOVE THE SURFACE OF THE PATHWAY, WITH THE BOTTOM OF THE EDGING A MAXIMUM OF $2^{1}/_{2}$ INCHES ABOVE THE SURFACE OF THE PATHWAY TO BE DETECTABLE BY USERS OF LONG CANES.
9. WHEN DRUMS, CONES, OR TUBULAR MARKERS ARE USED TO CHANNELIZE PEDESTRIANS, LOCATE THEM SUCH THAT THERE ARE NO GAPS BETWEEN THE BASES OF THE DEVICES IN ORDER TO CREATE A CONTINUOUS BOTTOM, AND THE HEIGHT OF EACH INDIVIDUAL DRUM, CONE, OR TUBULAR MARKER IS NO LESS THAN 36 INCHES TO BE DETECTABLE TO USERS OF LONG CANES. WHEN BARRICADES ARE USED TO CHANNELIZE PEDESTRIANS, THE BOTTOM OF THE BOTTOM RAIL WILL BE NO HIGHER THAN 6 INCHES OFF THE GROUND IN ADDITION TO THE ABOVE REQUIREMENTS.
10. USE A 20' CORNER RADIUS TO DEVELOP A TEMPORARY WALKWAY AROUND A CORNER.
11. DIRECT PEDESTRIANS TO AN INTERSECTION OR MARKED CROSSWALK AS AN ALTERNATE ROUTE WHEN POSSIBLE.
12. CONSULT REGION TRAFFIC ENGINEER WHEN SCHOOL ROUTING PLANS ARE AFFECTED.
13. DO NOT DIRECT PEDESTRIANS TO OPPOSITE SIDE IF SIDEWALK DOES NOT EXIST.
14. PROVIDE A 5' x 5' PASSING AREA EVERY 200 FEET OF TEMPORARY SIDEWALK.
15. SEE STD DWG GW 5 SERIES FOR DESIGN DETAILS.

REVISIONS

NO.	DATE	APPR.	REMARKS

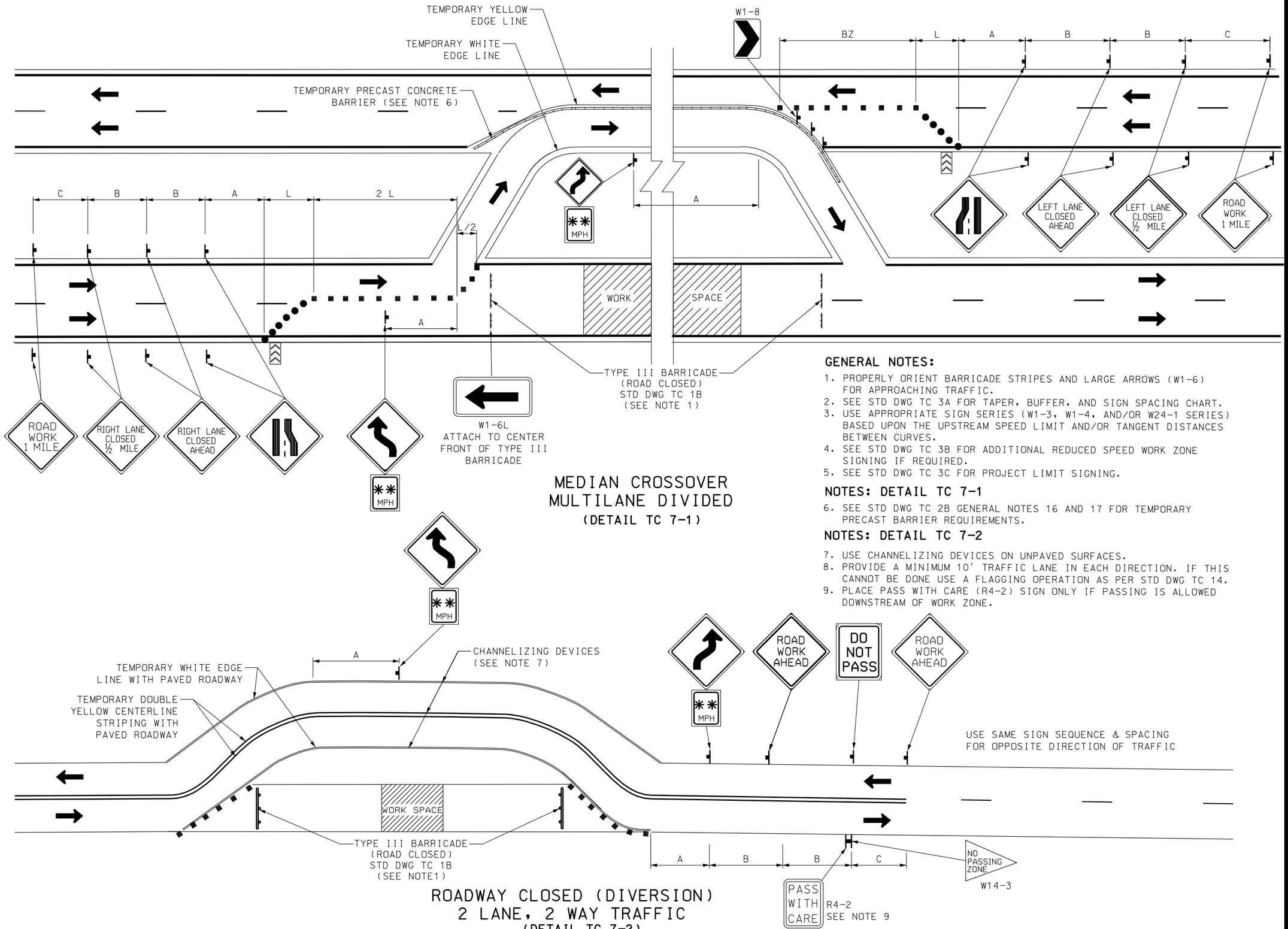
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

RECOMMENDED FOR APPROVAL — JUN.28,2007 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — JUN.28,2007 DATE
DEPUTY DIRECTOR

TRAFFIC CONTROL PEDESTRIAN ROUTING

STANDARD DRAWING TITLE

STD DWG
TC 6



MEDIAN CROSSOVER MULTILANE DIVIDED
(DETAIL TC 7-1)

ROADWAY CLOSED (DIVERSION) 2 LANE, 2 WAY TRAFFIC
(DETAIL TC 7-2)

GENERAL NOTES:

1. PROPERLY ORIENT BARRICADE STRIPES AND LARGE ARROWS (W1-6) FOR APPROACHING TRAFFIC.
2. SEE STD DWG TC 3A FOR TAPER, BUFFER, AND SIGN SPACING CHART.
3. USE APPROPRIATE SIGN SERIES (W1-3, W1-4, AND/OR W24-1 SERIES) BASED UPON THE UPSTREAM SPEED LIMIT AND/OR TANGENT DISTANCES BETWEEN CURVES.
4. SEE STD DWG TC 3B FOR ADDITIONAL REDUCED SPEED WORK ZONE SIGNING IF REQUIRED.
5. SEE STD DWG TC 3C FOR PROJECT LIMIT SIGNING.

NOTES: DETAIL TC 7-1

6. SEE STD DWG TC 2B GENERAL NOTES 16 AND 17 FOR TEMPORARY PRECAST BARRIER REQUIREMENTS.

NOTES: DETAIL TC 7-2

7. USE CHANNELIZING DEVICES ON UNPAVED SURFACES.
8. PROVIDE A MINIMUM 10' TRAFFIC LANE IN EACH DIRECTION. IF THIS CANNOT BE DONE USE A FLAGGING OPERATION AS PER STD DWG TC 14.
9. PLACE PASS WITH CARE (R4-2) SIGN ONLY IF PASSING IS ALLOWED DOWNSTREAM OF WORK ZONE.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JUN.28,2007 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — JUN.28,2007 DATE
DEPUTY DIRECTOR

TRAFFIC CONTROL ROAD CLOSED, DIVERSION

STANDARD DRAWING TITLE

STD DWG
TC 7

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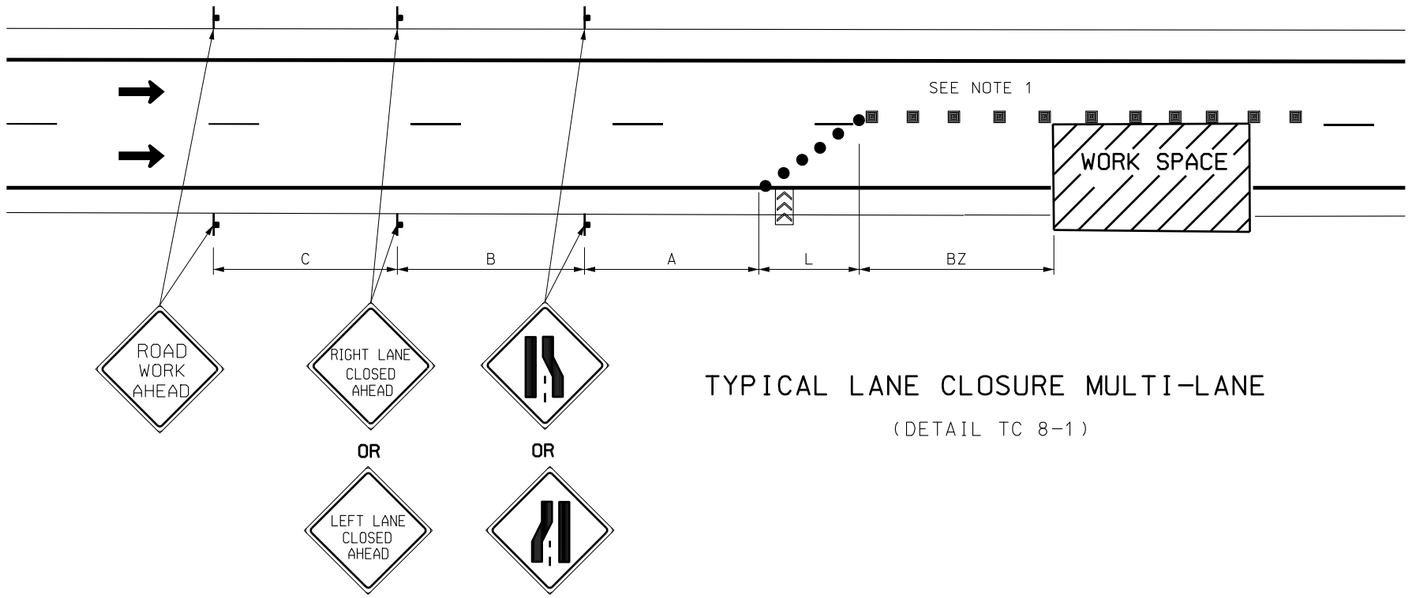
12-JUN-2007

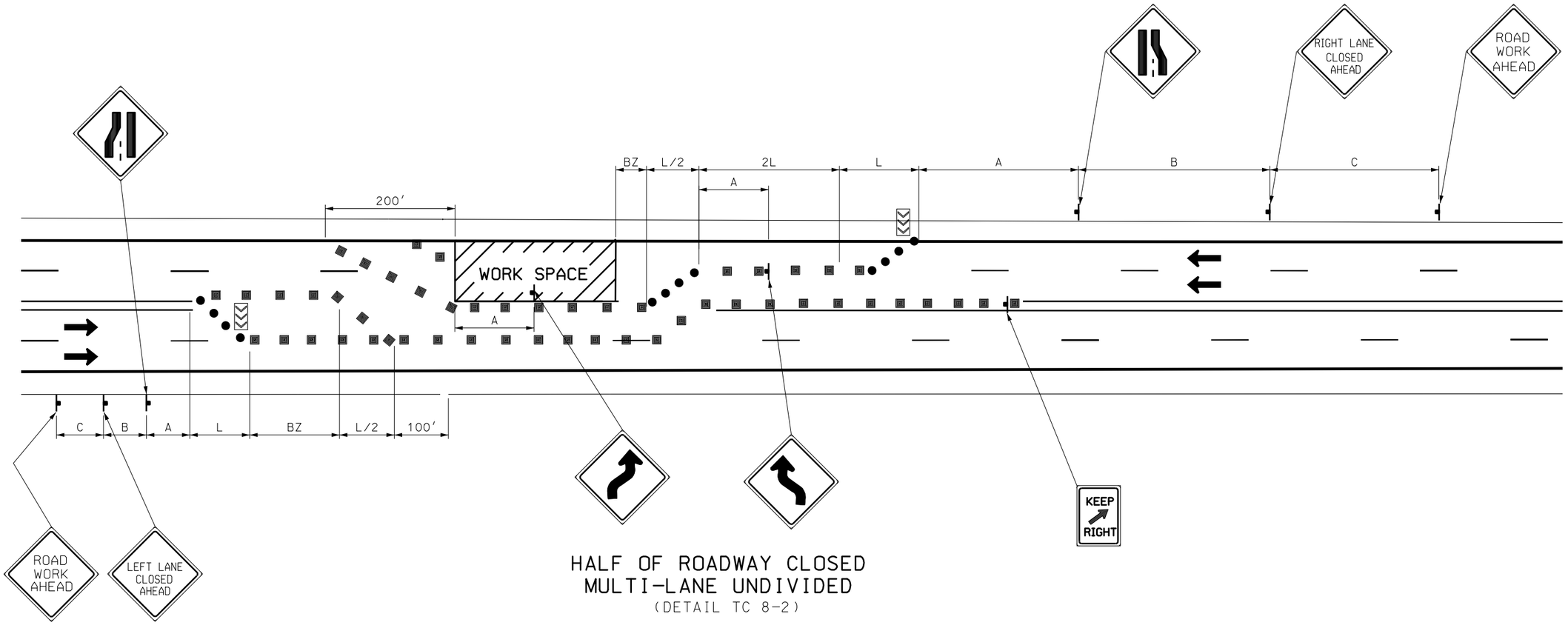


TYPICAL LANE CLOSURE MULTI-LANE

(DETAIL TC 8-1)

NOTES:

1. USE PLASTIC DRUMS FOR LANE CLOSURE TAPER DEVICES FOR SPEEDS OF 50 MPH AND GREATER.
2. SEE STD DWG TC 3A FOR TAPER, BUFFER ZONE, AND SIGN SPACING CHART.
3. USE APPROPRIATE SIGN SERIES (W1-3, W1-4, AND/OR W24-1 SERIES) BASED UPON THE UPSTREAM SPEED LIMIT AND/OR TANGENT DISTANCES BETWEEN CURVES.



HALF OF ROADWAY CLOSED
MULTI-LANE UNDIVIDED

(DETAIL TC 8-2)

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH 2007

RECOMMENDED FOR APPROVAL — JUN.28,2007 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — JUN.28,2007 DATE
DEPUTY DIRECTOR

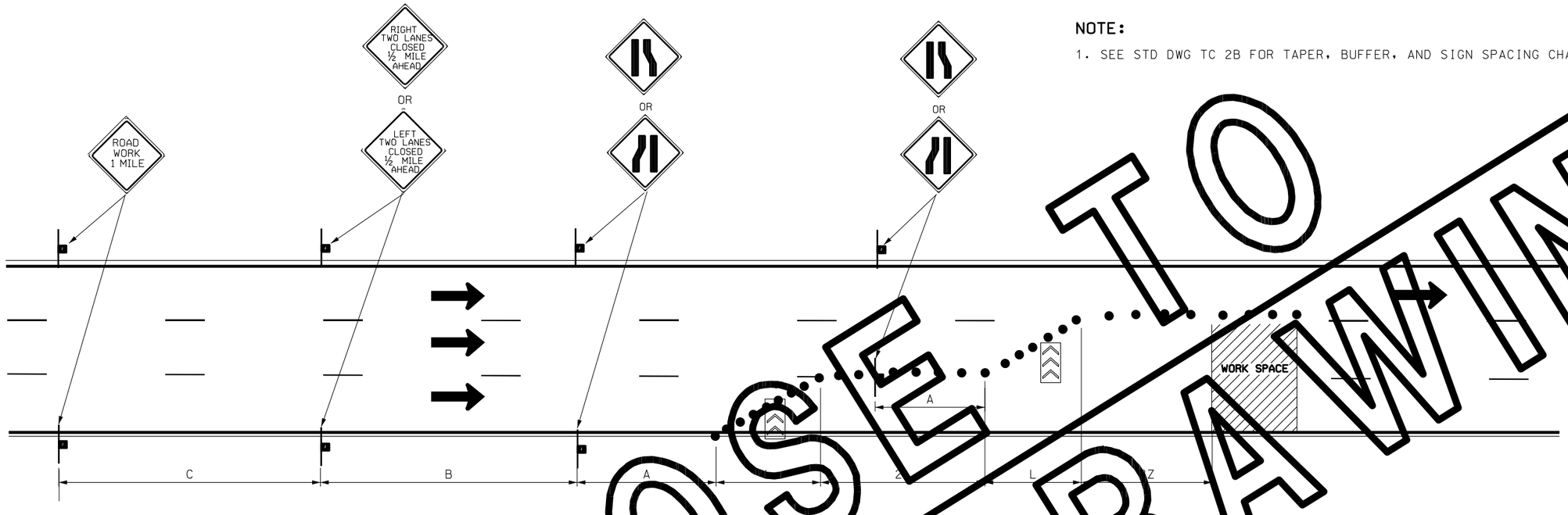
TRAFFIC CONTROL
LANE CLOSURE

STANDARD DRAWING TITLE

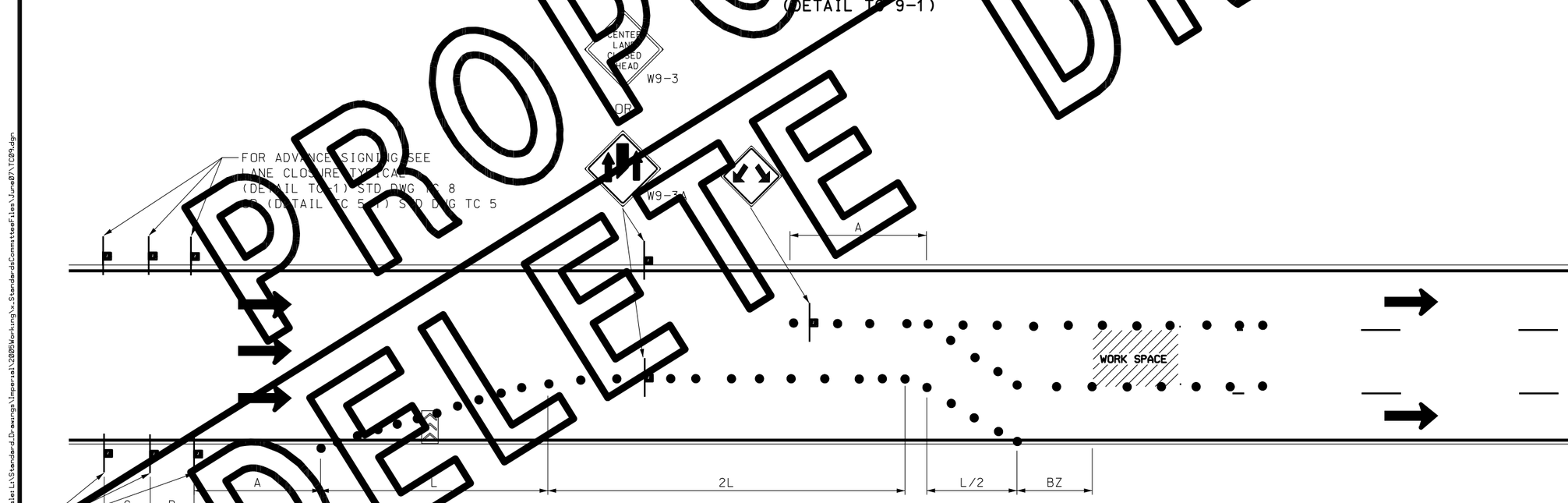
STD DWG
TC 8

NOTE:

1. SEE STD DWG TC 2B FOR TAPER, BUFFER, AND SIGN SPACING CHART.



TWO LANES CLOSURE
(DETAIL TC 9-1)



CENTER LANE CLOSURE
(DETAIL TC 9-2)

PROPOSE TO DELETE DRAWING

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

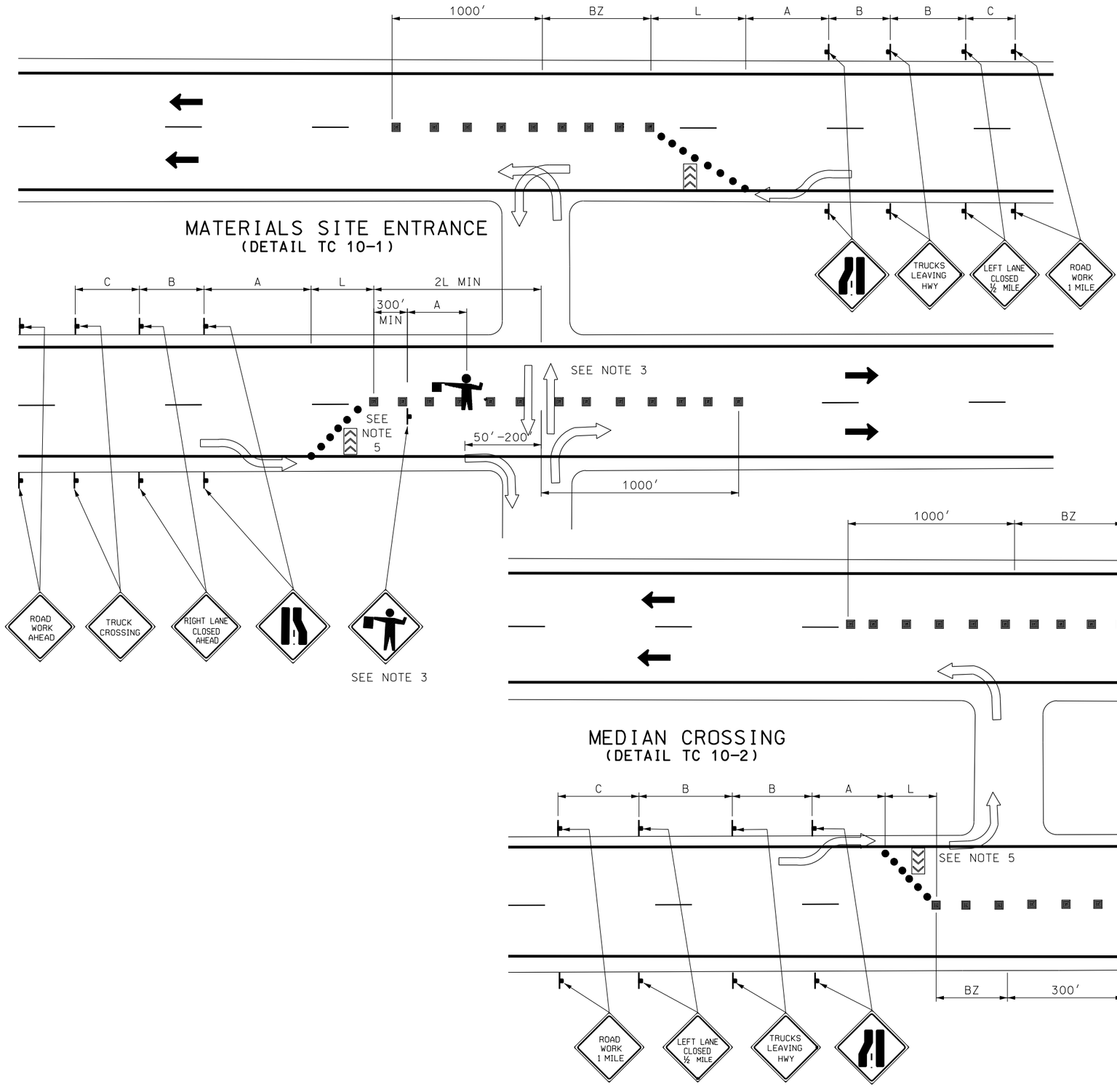
RECOMMENDED FOR APPROVAL — DEPUTY DIRECTOR — FEB.23,2006 DATE
CHAIRMAN STANDARDS COMMITTEE — APPROVED — FEB.23,2006 DATE

NO.	DATE	APPR.	REVISIONS REMARKS

TRAFFIC CONTROL MULTILANE CLOSURE

STANDARD DRAWING TITLE

STD DWG
TC 9



NOTES:

1. THREE MILES OR GREATER IS REQUIRED BETWEEN TEMPORARY MEDIAN CROSSOVERS OR TURNAROUNDS.
2. DO NOT USE A CROSSOVER OR TURNAROUND WHEN AN INTERCHANGE IS WITHIN 4 MILES OF THE PROJECT, EXCEPT AS APPROVED BY THE REGION TRAFFIC ENGINEER.
3. CONSTRUCTION TRAFFIC CROSSING THE ACTIVE LANES HAS THE RESPONSIBILITY TO STOP OR YIELD TO THROUGH TRAFFIC. USE OF A FLAGGER IS PERMITTED IF SIGHT DISTANCE IS INADEQUATE TO NOTIFY CROSSING TRAFFIC WHEN TO PROCEED SAFELY. FLAGGERS WILL NOT STOP THROUGH TRAFFIC.
4. SEE STD DWG TC 3A FOR TAPER, BUFFER ZONE, AND SIGN SPACING CHART.
5. PLACE ADVANCE WARNING ARROW PANEL IN FIRST THIRD OF TAPER IN TRAFFIC LANE WHEN EXITING VEHICLES ARE USING THE SHOULDER.
6. PLACE TYPE III BARRICADES WITH ROAD CLOSED (R11-2) SIGNS ACROSS AN EXCLUSIVE USE HAUL ROAD WHEN IT IS NOT IN USE.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

RECOMMENDED FOR APPROVAL — JUN.28.2007

CHAIRMAN STANDARDS COMMITTEE APPROVED — DATE JUN.28.2007

DEPUTY DIRECTOR — DATE

TRAFFIC CONTROL EXPRESSWAY AND FREEWAY CROSSOVER/ TURN AROUND

STANDARD DRAWING TITLE

STD DWG
TC 10

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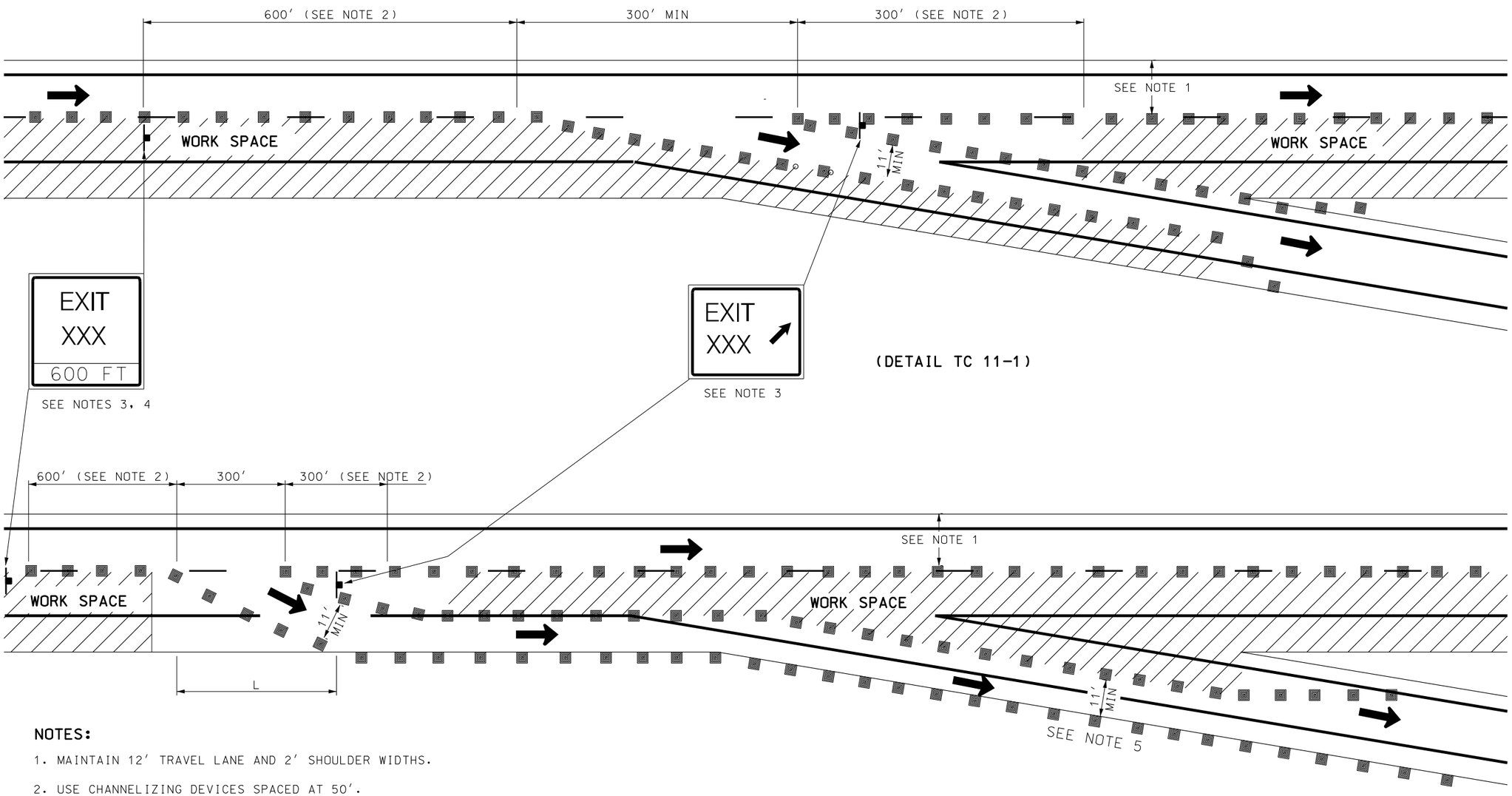
12-JUN-2007

TRAFFIC CONTROL FOR EXIT RAMP GORE



NOTES:

1. MAINTAIN 12′ TRAVEL LANE AND 2′ SHOULDER WIDTHS.
2. USE CHANNELIZING DEVICES SPACED AT 50′.
3. SEE STD DWG TC 3D FOR SIGN DESIGN AND LAYOUT.
4. SIGN IS SUPPLIMENTAL TO STANDARD EXIT GUIDE SIGNING.
5. CHANNELIZING DEVICES NOT REQUIRED FOR RAMP RIGHT SHOULDER WHEN AVAILABLE PAVEMENT WIDTH IS GREATER THAN 13 FEET (11′ TRAVEL LANE AND 2′ SHOULDER).

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

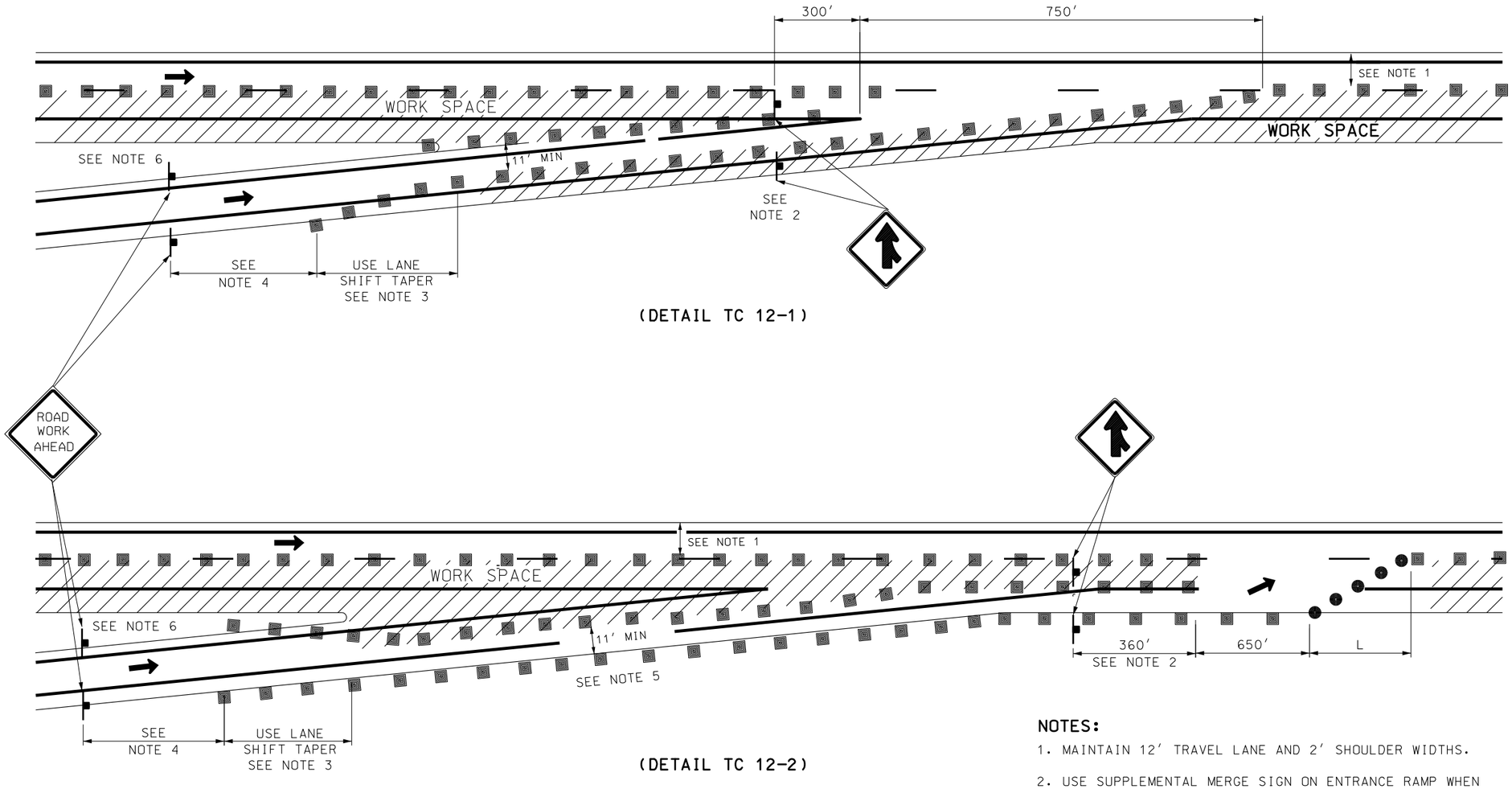
RECOMMENDED FOR APPROVAL — JUN.28,2007
CHAIRMAN STANDARDS COMMITTEE — DATE JUN.28,2007
APPROVED — DATE
DEPUTY DIRECTOR

TRAFFIC CONTROL
EXIT RAMP GORE

STANDARD DRAWING TITLE

STD DWG
TC 11

TRAFFIC CONTROL FOR ENTRANCE RAMP GORE



(DETAIL TC 12-1)

(DETAIL TC 12-2)

NOTES:

1. MAINTAIN 12′ TRAVEL LANE AND 2′ SHOULDER WIDTHS.
2. USE SUPPLEMENTAL MERGE SIGN ON ENTRANCE RAMP WHEN WORK SPACE IS WIDER THAN 12 FEET OR WORK OBSCURES MAIN LINE SIGN.
3. USE 40 MPH SPEED FOR RAMP TRAFFIC CONTROL DESIGN UNLESS POSTED OR ADVISORY SPEED IS GREATER, IN WHICH CASE USE THE HIGHEST SPEED.
4. RAMP ADVANCED WARNING SIGN DISTANCE
   250′ SPEED = 40 MPH
   500′ SPEED ≥ 45 MPH
5. CHANNELIZING DEVICES NOT REQUIRED ON RAMP RIGHT SHOULDER WHEN AVAILABLE PAVEMENT WIDTH IS GREATER THAN 13 FEET (11′ TRAVEL LANE AND 2′ SHOULDER).
6. USE SUPPLEMENTAL LEFT SIDE SIGNING FOR MULTI-LANE RAMPS.

REVISIONS

NO.	DATE	APPR.	REMARKS

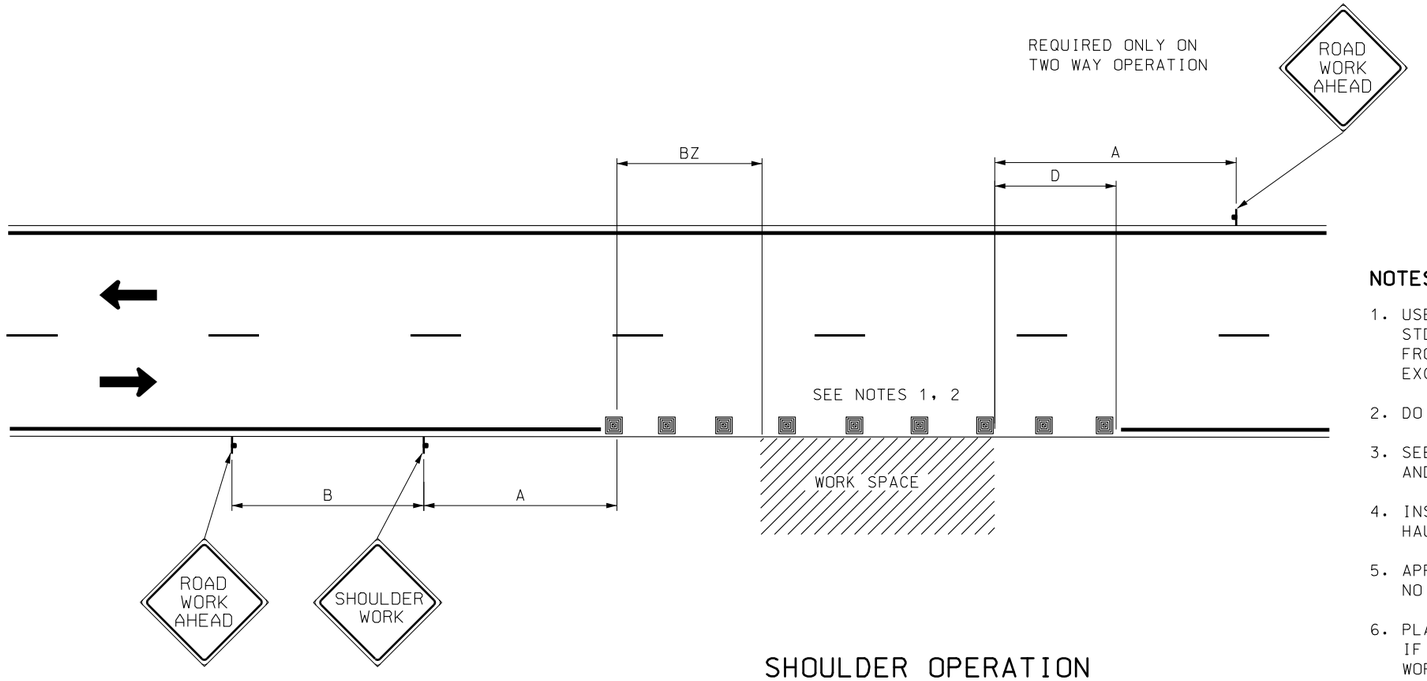
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JUN.28,2007
CHAIRMAN STANDARDS COMMITTEE APPROVED — DATE JUN.28,2007
DEPUTY DIRECTOR — DATE

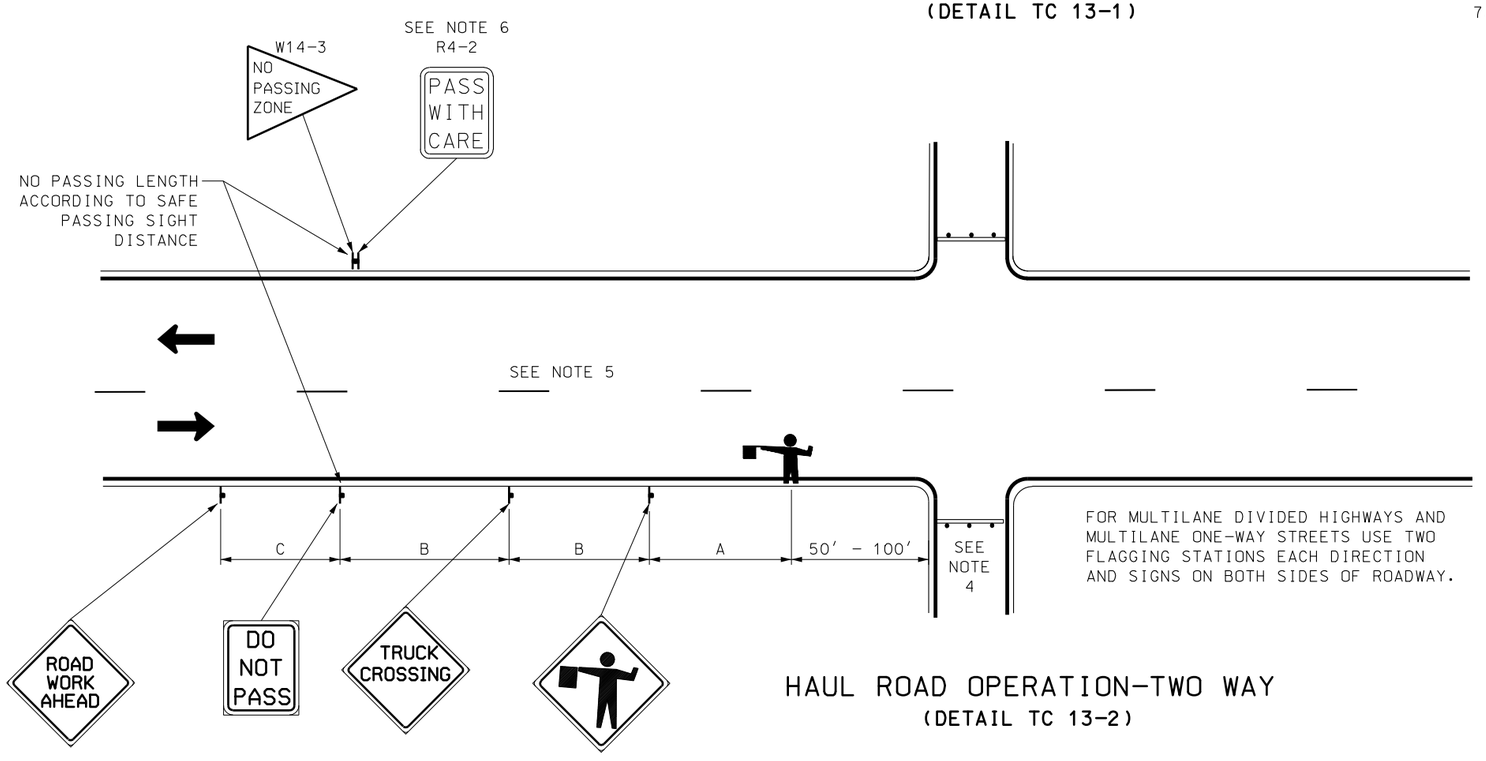
TRAFFIC CONTROL
ENTRANCE RAMP GORE

STANDARD DRAWING TITLE

STD DWG
TC 12



SHOULDER OPERATION
(DETAIL TC 13-1)



HAUL ROAD OPERATION-TWO WAY
(DETAIL TC 13-2)

NOTES:

1. USE CHANNELIZING DEVICES AS PER STD DWG TC 2A TO SEPARATE WORK ZONE FROM TRAVEL LANE WHEN WORK DURATION EXCEEDS 1 HOUR.
2. DO NOT ENCROACH INTO LANES.
3. SEE STD DWG TC 3A FOR TAPER, BUFFER, AND SIGN SPACING CHART.
4. INSTALL TYPE III BARRICADES WHEN HAUL ROAD IS NOT IN USE.
5. APPLY DOUBLE YELLOW STRIPING BETWEEN NO PASSING ZONE SIGNS.
6. PLACE "PASS WITH CARE" (R4-2) SIGN ONLY IF PASSING IS ALLOWED DOWNSTREAM OF WORK ZONE.
7. SEE STD DWG TC 3C FOR PROJECT LIMIT SIGNING.

USE SAME SIGN SEQUENCE AND SPACING FOR OPPOSITE DIRECTION OF TRAFFIC.

FOR MULTILANE DIVIDED HIGHWAYS AND MULTILANE ONE-WAY STREETS USE TWO FLAGGING STATIONS EACH DIRECTION AND SIGNS ON BOTH SIDES OF ROADWAY.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	06/30/05	L.M.	MEDIAN BREAK EXAMPLE MODIFIED.
2	03/22/07	W.S.	ADDED TRANSITION DETAIL & DETAIL A. MODIFIED NOTES
			CORNER PEDESTRIAN RAMP NOTES MODIFIED.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JUN.28.2007
CHAIRMAN STANDARDS COMMITTEE — DATE
APPROVED — JUN.28.2007
DEPUTY DIRECTOR — DATE

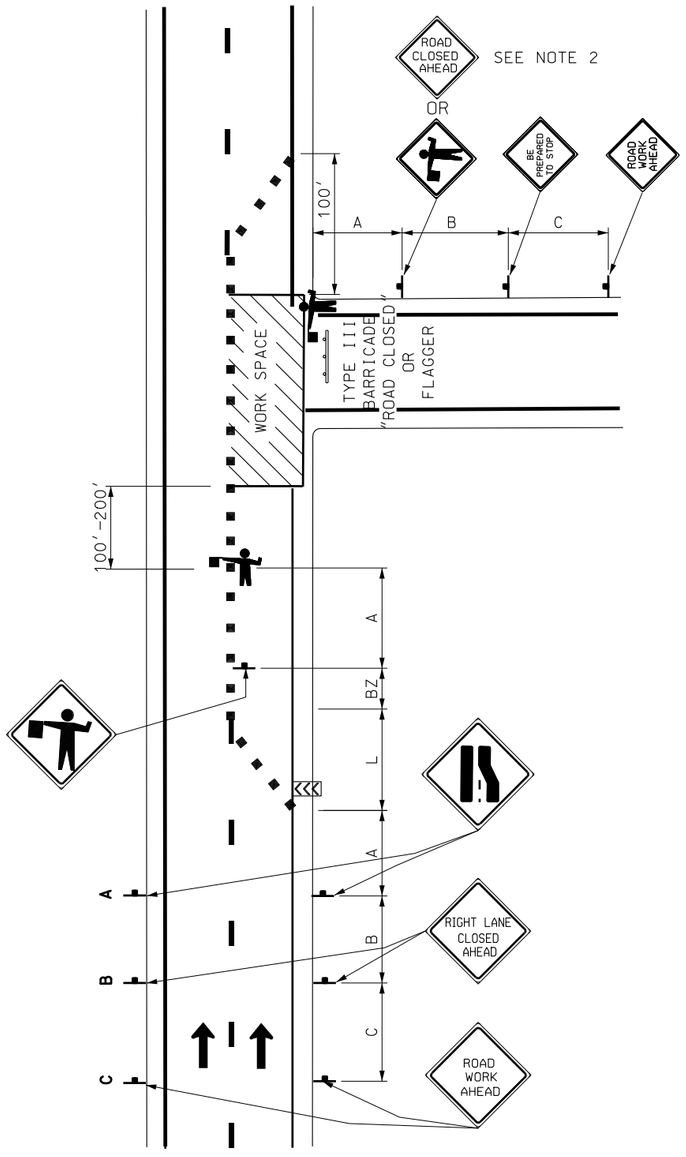
TRAFFIC CONTROL SHOULDER HAUL ROAD

STANDARD DRAWING TITLE

STD DWG
TC 13

NOTES:

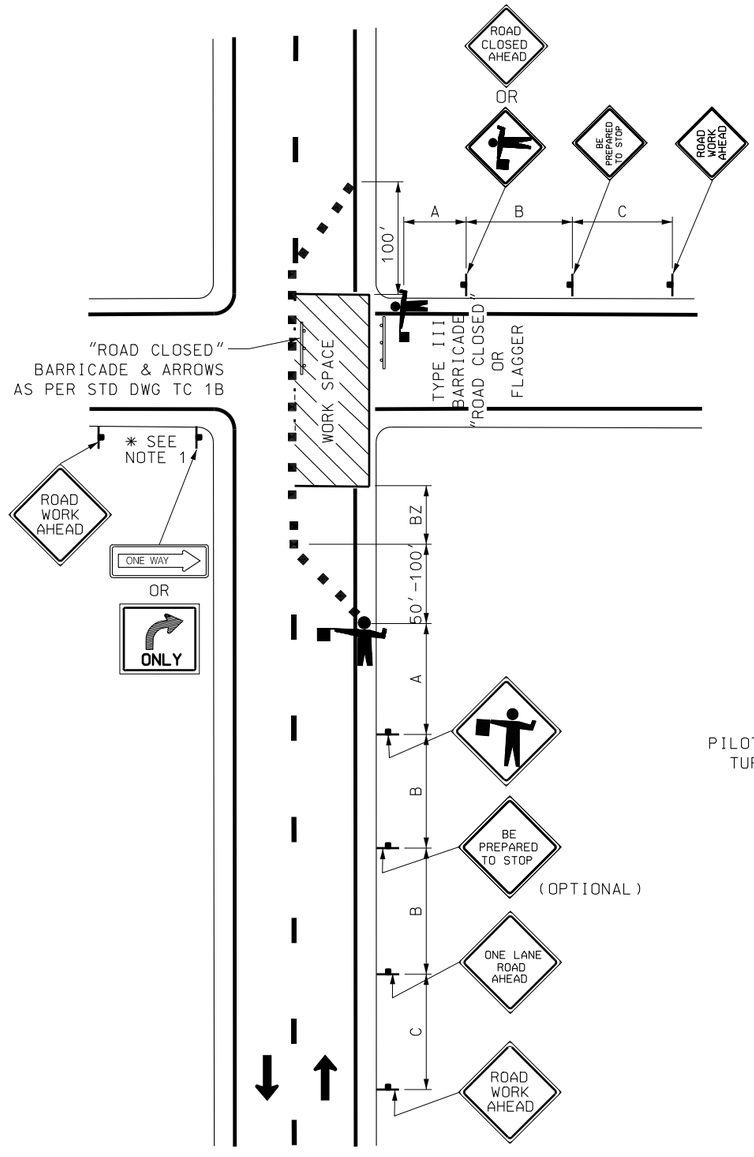
1. USE A FLAGGER AT ALL INTERSECTING ROADWAYS. REFER TO STD SPECIFICATION 01554 FOR REQUIREMENT AT OPERATING TRAFFIC SIGNALS.
2. PROVIDE FLAGGING IF TURNING TRAFFIC CONFLICTS WITH ONE-WAY TRAFFIC.
3. PROVIDE A DETOUR WHEN ROAD CLOSURE EXCEEDS 24 HOURS.
4. SEE STD DWG TC 3A FOR TAPER, BUFFER ZONE, AND SIGN SPACING CHART.
5. SEE STD DWG TC 3C FOR PROJECT LIMIT SIGNING.



FLAGGING OPERATION – ONE WAY
WITH POTENTIAL ENCROACHMENT
BY WORK VEHICLE

(DETAIL TC 14-1)

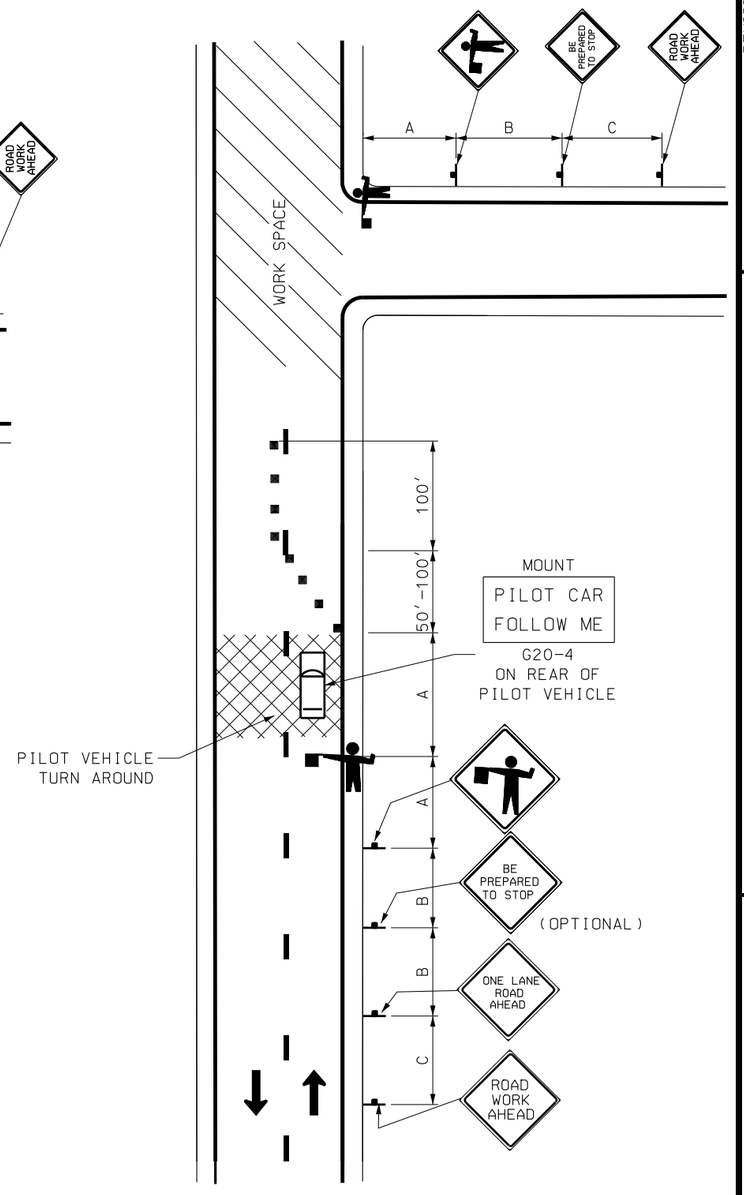
USE SAME SIGN SEQUENCE, SPACING,
& FLAGGER FOR OPPOSITE DIRECTION OF TRAFFIC.



FLAGGING OPERATION – TWO WAY
WITH ONE LANE CLOSED

(DETAIL TC 14-2)

USE SAME SIGN SEQUENCE, SPACING,
& FLAGGER FOR OPPOSITE DIRECTION OF TRAFFIC.



FLAGGING OPERATIONS
WITH USE OF PILOT VEHICLE

(DETAIL TC 14-3)

REVISIONS

NO.	DATE	APPR.	REMARKS
1	06/30/05	L.M.	MEDIAN BREAK EXAMPLE MODIFIED.
2	03/22/07	W.S.	ADDED TRANSITION DETAIL & DETAIL A. MODIFIED NOTES CORNER PEDESTRIAN RAMP NOTES MODIFIED.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

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DEPUTY DIRECTOR

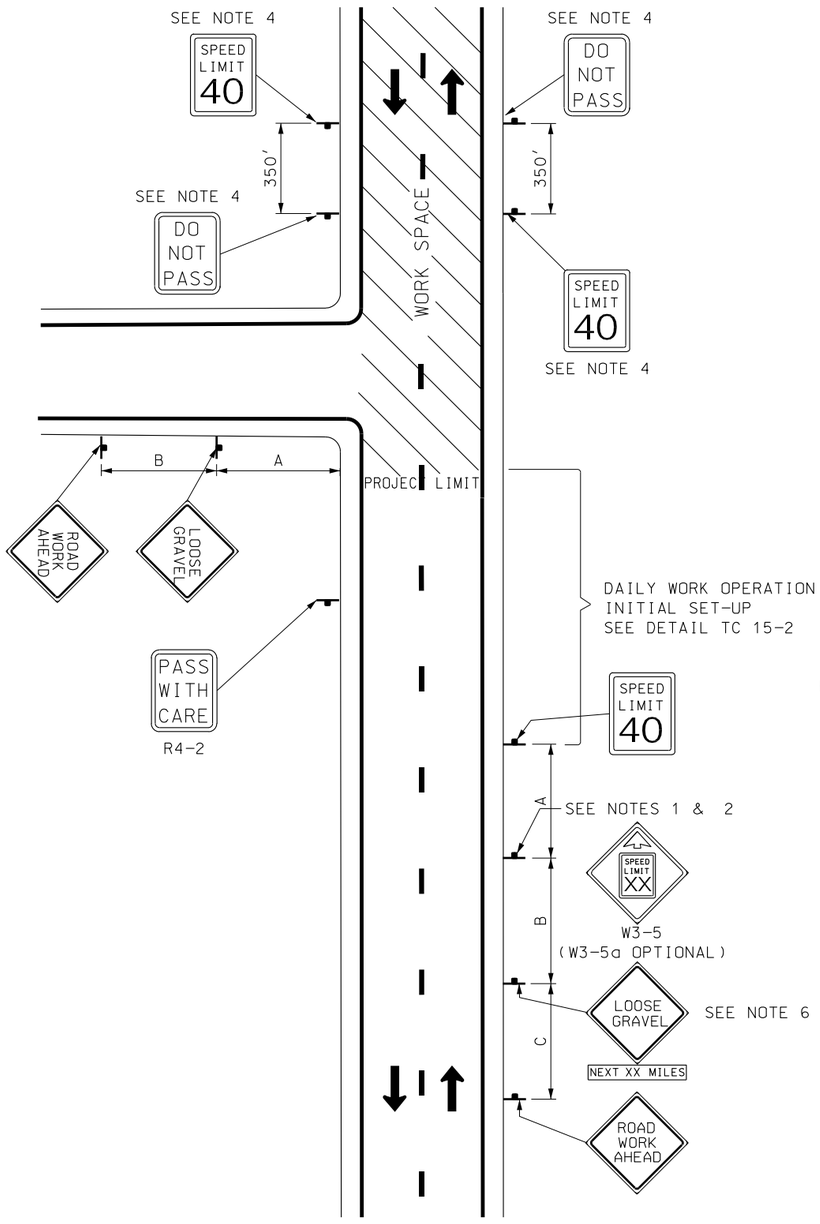
TRAFFIC CONTROL FLAGGING OPERATION

STANDARD DRAWING TITLE

STD DWG
TC 14

PROJECT SIGNING
2 LANE–2 WAY

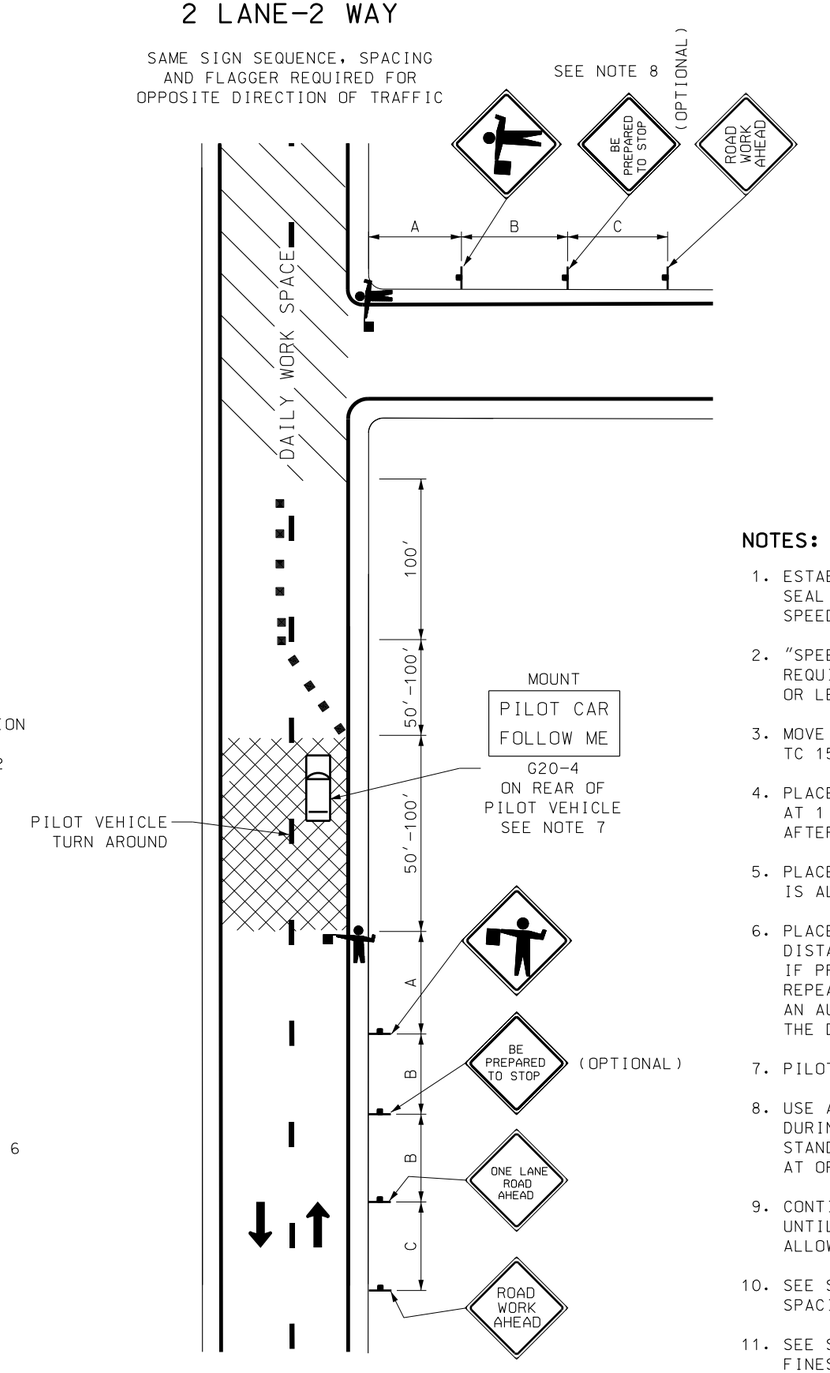
SAME SEQUENCE AND SPACING
REQUIRED FOR OPPOSITE
DIRECTION OF TRAFFIC



(DETAIL TC 15-1)

DAILY WORK OPERATION
2 LANE–2 WAY

SAME SIGN SEQUENCE, SPACING
AND FLAGGER REQUIRED FOR
OPPOSITE DIRECTION OF TRAFFIC



FLAGGING /PILOT VEHICLE
OPERATION
(DETAIL TC 15-2)

NOTES:

1. ESTABLISH A REDUCED SPEED LIMIT OF 40 MPH FOR SEAL COAT AND COVER MATERIAL OPERATIONS WHEN SPEEDS ARE GREATER THAN 40 MPH.
2. "SPEED REDUCTION" AND "SPEED LIMIT" SIGNING NOT REQUIRED WHEN EXISTING SPEED LIMITS ARE 40 MPH OR LESS.
3. MOVE DAILY WORK OPERATION SIGNING, DETAIL TC 15-2, AS WORK PROGRESSES.
4. PLACE "DO NOT PASS" AND "SPEED LIMIT" SIGNS AT 1 MILE INTERVALS THROUGH THE PROJECT AND AFTER MAJOR INTERSECTIONS.
5. PLACE "PASS WITH CARE" (R4-2) SIGN ONLY IF PASSING IS ALLOWED DOWNSTREAM OF WORK ZONE.
6. PLACE "LOOSE GRAVEL" SIGN WITH APPROPRIATE DISTANCE MESSAGE $^{1}/_{2}$ WAY THROUGH THE PROJECT IF PROJECT LENGTH IS LESS THAN 10 MILES. REPEAT EVERY 5 MILES ON LONGER PROJECTS WITH AN AUXILIARY DISTANCE PLAQUE COUNTING DOWN THE DISTANCE TO THE PROJECT LIMITS.
7. PILOT VEHICLE NOT TO EXCEED SPEED OF 40 MPH.
8. USE A FLAGGER AT ALL INTERSECTING ROADWAYS DURING DAILY WORK OPERATIONS. REFER TO STANDARD SPECIFICATION 01554 FOR REQUIREMENTS AT OPERATING TRAFFIC SIGNALS.
9. CONTINUE FLAGGING AND PILOT VEHICLE OPERATIONS UNTIL THE ENGINEER OR THEIR REPRESENTATIVE ALLOWS FREE FLOW TRAFFIC TO PROCEED.
10. SEE STD DWG TC 3A FOR TAPER, BUFFER, AND SIGN SPACING CHART.
11. SEE STD DWG TC 3D FOR DESIGN AND LAYOUT OF FINES DOUBLE AND FINES DOUBLE SPEED LIMIT ASSEMBLY IF REQUIRED.
12. SEE STD DWG TC 3C FOR PROJECT LIMIT SIGNING.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH 2007

RECOMMENDED FOR APPROVAL — JUN.28,2007 DATE
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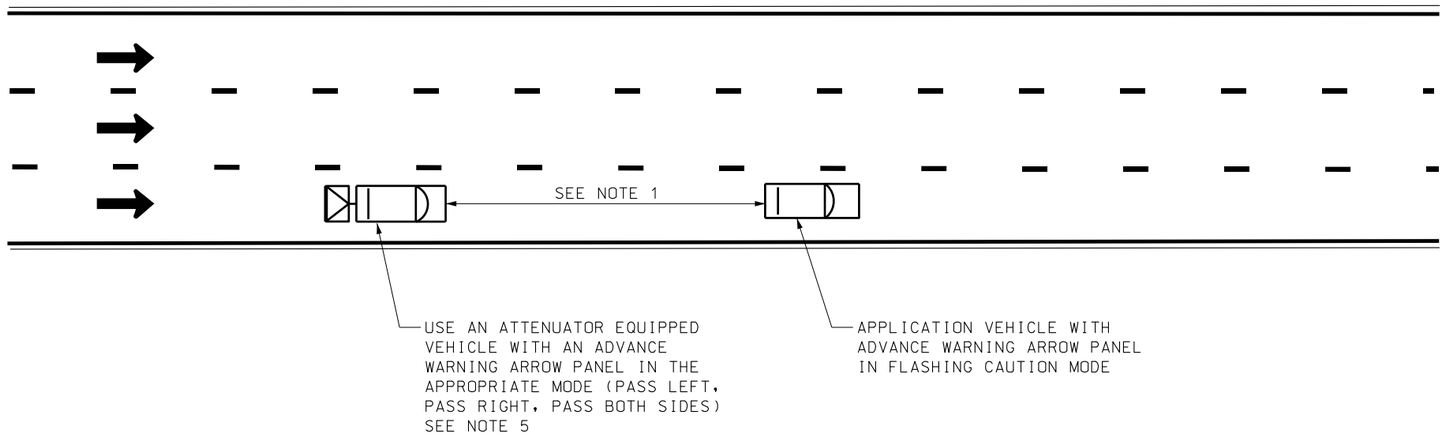
DEPUTY DIRECTOR

TRAFFIC CONTROL 2 LANE/ 2 WAY SEAL COAT WITH COVER MATERIAL

STANDARD DRAWING TITLE

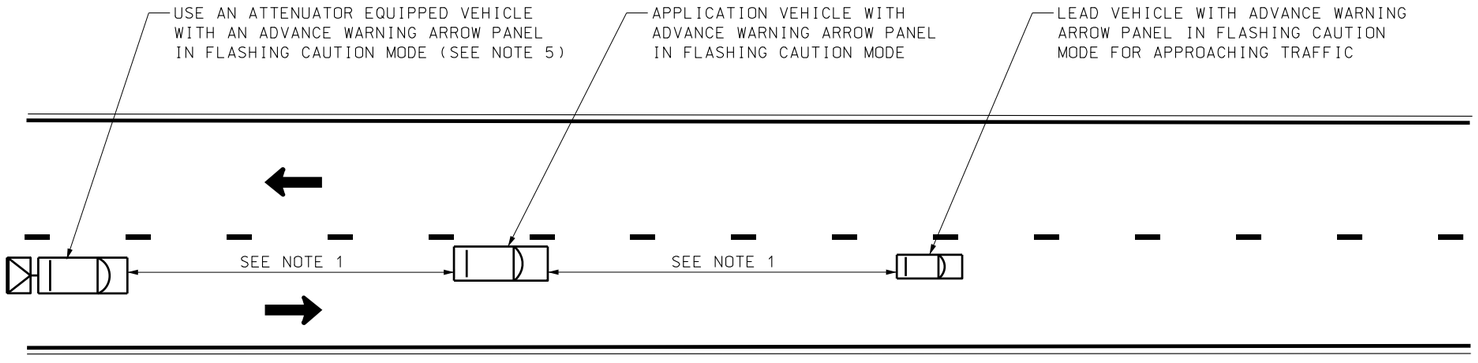
STD DWG
TC 15

DGN File:L:\Standard_Drawings\Imperial\2005\orkurg\x_StandardsCommitteeFiles\Jun07\TC15.dgn
12-JUN-2007



MULTILANE
LANE LINES & SHOULDERS

(DETAIL TC 16-1)



TWO LANE-TWO WAY
CENTER & SHOULDERS

(DETAIL TC 16-2)

NOTES:

1. DO NOT EXCEED 300' SPACING BETWEEN THE APPLICATING TRUCK AND THE FOLLOW OR LEAD VEHICLE.
2. NO STATIC SIGNS ARE REQUIRED WITH THESE OPERATIONS.
3. ALL EQUIPMENT TO HAVE ROTARY STROBE LIGHTS AND EMERGENCY FLASHERS IN OPERATION.
4. USE TYPE B ADVANCED WARNING ARROW PANEL. SEE STD DWG TC 1C.
5. USE NCHRP-350 APPROVED TRUCK MOUNTED ATTENUATOR (TMA) MEETING THE REQUIREMENTS FOR THE POSTED SPEED LIMIT.

   TL-2 RATED SYSTEM FOR SPEEDS 45 ≤ MPH,
   TL-3 RATED SYSTEM FOR SPEEDS 50 ≥ MPH.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JUN.28,2007 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — JUN.28,2007 DATE
DEPUTY DIRECTOR

TRAFFIC CONTROL
PAVEMENT MARKING

STANDARD DRAWING TITLE

STD DWG
TC 16

Standards Committee Submittal Sheet

Name of preparer: Degen Lewis
Title/Position of preparer: Concrete Engineer
Specification/Drawing/Item Title: Riprap
Specification/Drawing Number: 02373

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

Materials created a supplemental specification for 02373 last summer which deleted the sodium soundness test. We labeled this test as “superfluous” as we had never seen a failure in riprap products that met the other requirements of the LA wear test. However, since the publication of the supplemental last August we have found a riprap source that while meeting the requirements of the LA wear test, none the less fails the sodium soundness test (i.e. it dissolves in water). For this reason, Materials would like to revise the supplemental. Instead of simply returning to the original requirements of 02373, the supplemental will require the test unless waived by the Engineer due to past testing or experience with the contractor’s proposed aggregate source.

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

There are no changes required to the M&P.

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below. Indicate if no comments were received.

Note: There is a two-week response time set for this item.

Emailed to both on May 17, 2007

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)

None.

ACEC Comments: (Use as much space as necessary.)

None.

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)

This change has been reviewed and commented on by the Region Materials Engineers (RME) as part of the monthly RME meetings.

Emailed to the District Engineers on May 18, 2007.

Contractors (Any additional contacts beyond “C” above.)

None.

Suppliers

None.

Consultants (as required) (Any additional contacts beyond “C” above.)

None.

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

Emailed on May 18, 2007.

Anthony Sarhan brought to my attention a concern with our use of the LA abrasion test since that conflicted somewhat with a recent TRB paper recommending this test not be used for riprap. Phone discussions about the paper and its findings led to further ongoing research by Anthony. There is some doubt about the study's completeness as this finding contradicts a FHWA publication (which was also not reviewed as part of the study).

FHWA's concerns were discussed in the last monthly Region Materials Engineer's meeting. The group felt that the LA test has served Utah well and wants to remain with the original decision to restore the soundness test on as needed basis. If additional information is found by FHWA then the issue will be revisited.

Others (as appropriate)

None.

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)

None.

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)

None.

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

None required.

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.

None anticipated outside restoring the costs associated with running the test.

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).

None anticipated.

3. Life cycle cost.

None.

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)

While restoring this test also replaces the need to spend the money on this test, the test is needed to prevent water soluble aggregate being used on construction projects.

H. Safety Impacts?

None.

I. History? Address issues relating to the current usage of the item and past reviews, approvals, and/or disapprovals.

None.

Priority Explanation

Enter the appropriate priority in the box on the first page of the document.

Priority 1 Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.

Priority 2 Upon posting, this impacts projects being advertised.

Priority 3 Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

Supplemental Specification
2005 Standard Specification Book

SECTION 02373M

RIPRAP

Delete Article 2.1, Paragraph C and replace with the following:

2.1 AGGREGATE

C. Maximum 16 percent weighted loss per AASHTO T 104. Testing may be waived by the Engineer based on previous history or testing with the proposed aggregate source.

Standards Committee Submittal Sheet

Name of preparer: Degen Lewis
Title/Position of preparer: Concrete Engineer
Specification/Drawing/Item Title: Portland Cement Concrete
Specification/Drawing Number: 03055

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

The entire specification was reviewed and updated. The self consolidating concrete (SCC) specification was combined into this specification. Pay reduction factors changed to be consistent with the concrete pavement specification. Requirements added for use of blended hydraulic cements. Classes of concrete above AA were removed from table five and referenced by a note below the table which says the same thing the table did (but only once). Limitations were moved to the appropriate "product" specification (structural, pavement, etc.).

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

There are no changes required to the M&P.

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below.

Indicate if no comments were received.

Note: There is a two-week response time set for this item.

Emailed to both on May 18, 2007

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)
None.

ACEC Comments: (Use as much space as necessary.)
None.

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)

Emailed to the District Engineers, Region Materials Engineers, and Region Pavement Engineers on May 18, 2007.

The rewrite of this specification was done by a group including UDOT staff and industry representatives. It was discussed by the Region Materials Engineers in their monthly meetings and presented to the UDOT Pavement Council.

Contractors (Any additional contacts beyond “C” above.)

None.

Suppliers

Emailed to Ben Blankenship at Ashgrove Cement, Todd Laker at Holcim Cement, and Mitzi Mcintyre at the Utah Chapter of the American Concrete Association on May 18, 2007.

Comment received from Christopher Bedford from Headwaters Resources (fly ash supplier)

"I had previously met with John Butterfield and Degan Lewis in regards to the fly ash specification changes. UDOT's intent is to change the fly ash specification from ASTM C-618 to the AASHTO M295. The issue I have with AASHTO M295 is the TABLE 2 Supplementary Optional Chemical Requirements. None of our fly ash sources available in Utah can be certified to meet the Optional Table 2 requirements. ASTM C-618 has since dropped this optional table. The Optional Table 2 limits available alkalies to 1.5%. All of our sources will occasionally exceed this limit. Our Technical Service Department will not certify to this specification that includes this optional table.

It was once thought that limiting available alkalies in fly ashes would help in mitigating ASR in reactive aggregates. Since the ASTM 1260/1567 mortar bar expansion test has been implemented, available alkalie limits in fly ash have not proven to help mitigation. For instance, when Bridger fly ash has available alkalies below 1.5% it does not necessarily perform well in 1260/1567 test.

I suggested to John Butterfield and Degan Lewis to change the fly ash spec to AASHTO M295 but delete the Optional Table 2 Chemical requirements. If UDOT feels that they have potential reactive aggregates for a project, run the 1260/1567 mortar bar expansion test and decide what fly ash and how much fly ash it will take to mitigate the potential ASR problem."

Chris is correct about our discussion and I missed making this change. 2.6.A.1 now reads "Class F, as specified. Conform to AASHTO M 295 except table 2."

Consultants (as required) (Any additional contacts beyond "C" above.)

None.

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

Emailed on May 18, 2007.

Others (as appropriate)

None.

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)

   None.

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)

   None.

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

   None required.

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.

   None anticipated.

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).

   None anticipated.

3. Life cycle cost.

   None.

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)

Allows cement industry more flexibility in using new cement products. Calls attention to SCC and its rising use in the projects. Moved information to other specifications where it is more directly relevant.

H. Safety Impacts?

None.

I. History? Address issues relating to the current usage of the item and past reviews, approvals, and/or disapprovals.

None.

Priority Explanation

Enter the appropriate priority in the box on the first page of the document.

Priority 1 Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.

Priority 2 Upon posting, this impacts projects being advertised.

Priority 3 Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

Supplemental Specification
2005 Standard Specification Book

SECTION 03055

PORTLAND CEMENT CONCRETE

Delete Section 03055 and replace with the following:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and procedures for producing Portland Cement Concrete.

1.2 RELATED SECTIONS

A. None.

1.3 REFERENCES

A. AASHTO M 6: Standard Specification for Fine Aggregate for Portland Cement Concrete

B. AASHTO M 80: Standard Specification for Coarse Aggregate for Portland Cement Concrete

C. AASHTO M ~~92: Wire-Cloth Sieves for Testing Purposes~~

~~D. AASHTO M~~ 154: Standard Specification for Air-Entraining Admixtures for Concrete

~~E~~D. AASHTO M 157: Standard Specification for Ready-Mixed Concrete

~~F~~E. AASHTO M 194: Standard Specification for Chemical Admixtures for Concrete

~~G. AASHTO M 241: Concrete Made by Volumetric Batching and Continuous Mixing~~

~~H. AASHTO T 23: Making and Curing Concrete Test Specimens in the Field~~

~~I. ASTM C 150: Portland Cement~~

~~J. ASTM C 595: Blended Hydraulic Cements~~

~~K. ASTM C 618:~~F. AASHTO M 295: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use ~~as a Mineral Admixture~~ in Concrete

~~L~~G. ASTM C 150: Standard Specification for Portland Cement

H. ASTM C 595: Standard Specification for Blended Hydraulic Cements

I. ASTM C 1157: ~~Blended~~Standard Performance Specification for Hydraulic Cement

~~M~~J. ASTM C 1240: Standard Specification for Silica Fume for ~~Use as a Mineral Admixture in Hydraulic Cement Concrete, Mortar, and Grout~~ Used in Cementitious Mixtures

~~N~~K. ASTM C ~~1260:~~ 1567: Standard Test Method for Determining the Potential Alkali-Silica Reactivity of ~~Aggregates (Mortar~~Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)

~~O~~L. ASTM C 1602: Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

M. American Concrete Institute ~~Standards~~ (ACI)

~~N~~. Precast/Prestressed Concrete Institute (PCI)

O. UDOT Materials Manual of Instruction

P. UDOT Minimum Sampling and Testing Requirements Manual

Q. UDOT Quality Management Plan

1.4 SUBMITTALS

A. Furnish to the Engineer a mix design for each class of concrete to be used.

1. Base concrete mix designs for all "A" concrete classes on trial batch test results or on UDOT's past project history (same materials used in previous mix designs within the past year).
2. Use the same components in the trial batches that are to be used in the project including coarse and fine aggregate, water, source and type of

cement, air-entraining agent, fly ash, etc., including any site-added admixtures intended to be used.

3. Unless specified otherwise, do not exceed 30 percent total pozzolan in any mix.

4. The Department or its representative witnesses the trial batch.

5. Mix concrete (trial batches) as specified in UDOT Materials Manual of Instruction Part 8-974: Guidelines for Portland Cement Concrete Mix Design.

6. Meet the following additional requirements for Self Consolidating Mixes (SCC):

   a. Design and mix according to ACI Manual of Concrete Practice 301: Specifications for Concrete.

   b. Provide mix specific flow and/or spread criteria.

   c. Meet PCI – TR-6-03. A visual stability index rating of 0 – 1 is required.

   d. Provide compressive strength data.

   e. Include documentation justifying any deviation from the aggregate operating bands required by Table 4 with the mix design for approval. Production may not begin until the deviation is approved.

B. Verification that cement used is from a pre-qualified supplier. See this Section, article 2.1 paragraph.E ~~this Section~~.

C. Verification that fly ash used in from a pre-qualified supplier. See this Section, article 2.6 paragraph A.1.d ~~this Section~~.

1.5 ACCEPTANCE

A. Acceptance is in accordance with UDOT Minimum Sampling and Testing Requirements.

B. When concrete is below specified strength and does not have a separate strength pay factor:

1. Department may accept item at a reduced price.
2. The pay factor will be applied to the portion of the item that is represented by the strength tests that fall below specified strength.
3. Department will calculate the pay factor as follows (based on 28 ~~days~~day compressive strength):

Psi below specified strength:	**Pay Factor:**
1 – 100	0.~~98~~95
101 – 200	0.~~94~~90
201 – 300	0.~~88~~85
301 – 400	0.80
More than 400	0.50 or Engineer may reject

PART 2 PRODUCTS

2.1 CEMENT

A. Use Type II Portland Cement, or Blended ~~Portland~~Hydraulic Cement, unless otherwise specified. (ASTM C 150, ASTM C 595, ASTM C 1157)

B. Portland Cement~~, Type II.~~
1. Follow Tables 1 and 3 in ASTM C 150.
2. Follow the requirements of Table 2 of ASTM C 150 for low-alkali cement.

~~C. Blended Portland Cement.~~
~~1. Type IP blended cement may be substituted for Type I cement. Conform to ASTM C 595.~~
~~2. Type IP (MS) blended cement may be substituted for Type II cement.~~
~~3. Type (HS) blended cement may be substituted for Type V cement, as specified in ASTM C 1157. Conform to requirements of ASTM C 595.~~
~~4. When blended cement is used in conjunction with reactive aggregate, use Option R as specified in ASTM C 1157. Conform to requirements of ASTM C 595.~~
~~5. Pretest the cement aggregate mixture and meet the specified design criteria at no additional cost to the Department.~~
~~6. Do not use fly ash as a replacement for any blended cement.~~

C. Blended Hydraulic Cement.
1. When Blended Hydraulic Cement is substituted for Portland Cement
   a. Use ASTM C 1567 to verify that expansion is less than 0.1 percent at 16 days.
   b. Refer to the equivalent cements listed in Table 1.
2. When adding flyash to a blended hydraulic cement ensure that the 30 percent total pozzolan limit is not exceeded.
   a. Submit documentation of the total pozzolan content with the mix design.

Table 1

Portland Cement/Blended Hydraulic Cement Equivalencies		
ASTM C150 (Low Alkali)	**ASTM C595**	**ASTM C1157**
Type I	IP	GU
Type II	IP (MS)	MS
Type III	-	HE
Type V	-	HS

D. Do not use cement that contains lumps or is partially set.

E. Use cement from the list of UDOT ~~pre-~~qualified ~~sources~~suppliers list maintained by the UDOT Materials Quality Assurance Section.

F. Do not mix cement originating from different sources.

G. Do not use air-entrained cement.

H. ~~Cement may be sampled~~Department will sample and ~~tested for compliance at any time~~test the cement in accordance with UDOT Quality Management Plan 502: Cement.

2.2 ~~COARSE~~ AGGREGATE

A. ~~As specified in~~ Coarse Aggregate for Normal Concrete Mixes

1. Use coarse aggregate meeting AASHTO M 80~~, and as modified, using physical properties.~~ Use one of the gradations found in Table ~~1~~2.
2. Do not exceed 1 percent of deleterious substances as shown in AASHTO M 80, Table 2, for Class A aggregates (material finer than No. 200 sieve: maximum allowable 1~~.0~~ percent, exception as noted in footnote d).

Table 2

Aggregate Gradations - Percent Passing (by weight)								
Aggregate or Sieve Size (inches)	**2-1/2**	**2**	**1-1/2**	**1**	**3/4**	**1/2**	**3/8**	**No. 4**
2 to No. 4	100	95-100		35-70		10-30		0-5
1-1/2 to No. 4		100	95-100		35-70		10-30	0-5
1 to No. 4			100	95-100		25-60		0-10
¾ to No. 4				100	90-100		20-55	0-10

~~B. Use sieve screens with square openings as specified. Meet AASHTO M 92.~~

C. Do not exceed percentages of deleterious substances as shown in AASHTO M 80, Table 1, for Class A aggregates.

D. Determine the suitability of coarse aggregate sources using the requirements for soundness, percentage of wear and potential reactivity as specified in AASHTO M 80.

2.3 FINE AGGREGATE

A. As specified using one of the gradations shown in Table 2. Meet AASHTO M 6.

Table 2

B. Fine Aggregate for Normal Concrete Mixes

1. Use fine aggregate meeting AASHTO M 6 physical properties. Use the gradation found in Table 3.
2. Do not exceed 3.0 percent of deleterious substances as outlined in AASHTO M 6, Table 2, for class A aggregates, using option "b" for material finer than the No. 200 sieve (material finer than No. 200 sieve: maximum allowable 3.0 percent).

Table 3

Gradation	
Sieve Size	**Percent Passing (by weight)**
3/8 inch No. 4 No. 16 No. 50 No. 100	100 95 to 100 45 to 80 10 to 30 2 to 10
No. 4	95 to 100
No. 16	45 to 80
No. 50	10 to 30
No. 100	2 to 10

B. Do not exceed percentages of deleterious substances as outlined in AASHTO M 6 for class A aggregates, using b for material finer than the No. 200 sieve.

C. Soundness: As specified to determine suitability of fine aggregate. Meet AASHTO M 6.

2.4 CONTRACTOR FURNISHED AGGREGATE

A. Engineer evaluates aggregate from a non-state specified source.

1. Proportion mix designs accordingly to mitigate any potential performance problems inherent to the aggregate source.

~~2. Pay additional costs incurred from using a Contractor furnished source.~~

~~2.5 WATER~~

~~A. Potable, or water that meets the specified test standard in AASHTO M 241.~~

C. Coarse and Fine Aggregate for Self Consolidating Concrete (SCC) Mixes.

1. Combined gradations of coarse and fine aggregates must be within the bands shown in Table 4. Establish targets and production tolerances necessary to meet the requirements of Table 4.

Table 4

Aggregate Gradations (Percent Passing by Dry Weight of Aggregate)		
Sieve Size	**¾ inch Operating Bands**	**½ inch Operating Bands**
~~3/4~~¾ -inch	95 – 100	–
~~1/2~~½ -inch	65 – 95	95 –100
$^{3}/_{8}$ inch	58 – 83	65 – 95
No. 4	35 – 65	50 – 80
No. 8	25 – 50	30 – 60
No. 16	15 – 35	20 – 45
No. 30	10 – 35	12 –35
No. 50	5 – 20	5 – 20
No. 100	1 – 12	2 – 12
No. 200	0 – 2	0 – 2

2.4 WATER

A. Use potable water or water meeting ASTM C 1602, including Table 2.

B. Screen out extraneous material when pumping water from streams, ponds, lakes, etc.

2.~~6~~5 ADMIXTURES

A. Air Entrainment: as specified. Meet AASHTO M 154, including Section 5.

~~1. Site-added air entraining admixtures.~~

~~a. Utilize admixture in the trail batch.~~

~~b. Use pre-measured admixtures only.~~

~~c. Record amount used on batch ticket.~~

~~d. Rotate the drum at least 30 revolutions at the mixing speed recommended by the manufacturer.~~

~~e. Maximum of 3 trucks in a row can be job-site dosed.~~

~~B. Water Reducing Agents: as specified. Meet AASHTO M 194.~~

~~1. The chlorides content (as Cl-) not exceeding 1 percent by weight of the admixtures.~~

~~2. Site-added water reducing agents will be added as in this Section, article 2.7, paragraph A 1.~~

~~C. Do not use calcium chloride.~~

~~D. Protect all admixtures from freezing.~~

~~2.7 POZZOLAN~~

B. Water Reducing Agents/Accelerators: The chlorides content (as Cl-) must not exceed 1 percent by weight of the admixtures. Meet AASHTO M 194.

1. High Range Water Reducer (HRWR): Submit a written plan for approval with the trial batch that shows proper attention will be given to ingredients, production methods, handling and placing.
2. Do not use calcium chloride.

C. Set Retarding Admixtures: If set retarding admixtures are required due to haul times exceeding the time limitations in this Section, article 3.4, paragraph A, establish the effective life of the set-retarding admixture by trial batch.

1. Do not exceed any manufacturer recommendations for the use of the set-retarding admixture.
2. Do not re-dose the concrete with additional set retarding admixture.
3. Add set retarding admixture at the batch plant at the time of initial batching operations.
4. Show on batch tickets the amount of admixture used.
5. Time of placement is established by the trial batch and supersedes the requirements in this Section, article 3.4, paragraph A.

D. Viscosity Modifying Admixtures.

1. Do not exceed any manufacturer recommendations for the use of the viscosity modifying admixture.
2. Do not re-dose the concrete with additional viscosity modifying admixture.
3. Show on batch tickets the amount of admixture used.

E. Site-added admixtures.

1. Use admixture in the trial batch.
2. Use pre-measured admixtures only.
3. Record amount used on batch ticket.
4. Rotate the drum at least 30 revolutions at the mixing speed recommended by the manufacturer.

2.6 POZZOLAN

A. Fly Ash:

1. Class F, as specified. Conform to AASHTO M 295 except table 2.
   a. Unless specified otherwise, replace a minimum of 20 percent of the Portland cement by weight. Use the minimum cement content in the design formulas before replacement is made.
   b. Loss on Ignition (LOI): not to exceed 3 percent.
   c. Maximum allowable CaO content: not to exceed 15 percent.
   d. ~~Conform to ASTM C 618, Class F.~~
   ~~e. Use the minimum cement content in the design formulas before replacement is made.~~
   ~~f.~~ Use fly ash from the list of UDOT pre-qualified sources maintained by the UDOT Materials Quality Assurance.
   ~~g~~e. Label the storage silo for fly ash to distinguish it from cement.
   ~~h~~f. Use different size unloading hoses and fittings for cement and fly ash.
2. Fly ash may be sampled and tested for compliance at any time.

B. Natural Pozzolan (Class N)

1. Conform to ~~ASTM C 618~~AASHTO M 295.
2. May use instead of fly ash provided that the ~~14-day~~ expansion ~~test (ASTM C 1260) with job aggregates and job cement~~, according to ASTM C 1567, does not exceed ~~that for the same aggregates and cement with a UDOT approved Class F fly ash~~0.1 percent.

C. Silica Fume: Conform to ASTM C 1240.

2.~~8~~7 MIX DESIGN

A. ~~Furnish to the Engineer a~~ Do not place concrete without written approval of the mix design ~~for each class of concrete to be used~~.

~~1~~

B. Do not change the mix design without written approval.

~~2. Base concrete mix designs for all "A" concrete classes on trial batch test results or on past history (same materials used in previous mix designs within the past year).~~

~~3. Use the same components in the trial batches that are to be used in the project including coarse and fine aggregate, water, source and type of cement, air-entraining agent, fly ash, etc., including any site-added admixtures intended to be used.~~

~~4. The Department or its representative witnesses the trial batch.~~

~~5. Mix concrete (trial batches) as specified.~~

PART 3 EXECUTION

3.1 PREPARATION

A. Aggregate stockpiles:

1. ~~Clear, grub, smooth, and compact the site.~~
2. ~~2.~~ Construct stockpile platforms so that subgrades are prevented from intruding into aggregates.
3. ~~3~~2. Build stockpiles at least two days before use.
4. ~~4~~3. Provide an operator and front-end loader to help the Engineer take aggregate samples.
5. ~~5. Acceptance is made~~4. Aggregate may be accepted in daily increments, but not more than 30 days before use.
6. ~~6~~5. Provide separate stockpiles for coarse and fine aggregate.
7. ~~7~~6. Construct stockpiles ~~in thin layers (5 ft maximum) that have uniform thickness and a regular form.~~
   a. ~~Do not build high, cone-shaped piles above the maximum height of 10 ft before distribution.~~
   b. ~~Do not dump or spill aggregate over the sides of the stockpile.~~
   c. ~~Minimize~~to minimize segregation of aggregate.~~–~~
8. ~~8~~7. Allow washed aggregates to drain to ~~a~~ uniform moisture content before use (12 hours minimum).
9. ~~9. Move conveyor continuously across the stockpile as aggregate is discharged.~~
10. ~~10. Do not drop material more than 10 ft from conveyor.~~

~~B. Heating Aggregate and Water~~

1. ~~Provide and operate heating devices at no additional cost to the Department when heated aggregates are required.~~
2. ~~Aggregates must be free of ice.~~
3. ~~Heat aggregates uniformly, when required. Avoid overheating or developing hot spots.~~
4. ~~Meet temperature control requirements found in article 3.7, paragraph C.~~
5. ~~Meet cold weather limitations found in this Section.~~
6. ~~Use either steam or dry heat.~~
7. ~~Do not allow the products of fuel combustion to contact the aggregate.~~
8. ~~Heat the mixing water to between 70 degrees F and 180 degrees F when introduced into the mixer.~~

3.2 CONCRETE CLASSES AND MIX REQUIREMENTS

A. Meet the requirements in Table ~~3~~5.

~~Table 3~~

Table 5

Concrete Classes and Mix Requirements							
Class	**Coarse Aggregate or Sieve Size ~~(inch)~~**	**Max. Water/ ~~Cement~~Cementitous Ratio**	**Min. ~~Cement~~Cementitous Content (lb/yd^3)**	**Slump ~~(inch)~~(Inch) See Article G for further Criteria**	**Air Content Percent (%)***	**Mix Design Compress *f*'cr (Psi)**	**28 Day Minimum Compress *f*'c (Psi) ****
~~6A~~AA(AE)	**~~2~~" to No. 4 1-1/2" to No. 4 1" to No. 4 ¾" to No. 4	**~~0.44~~ 0.44 0.44 0.44	**~~564~~ 564 611 611	**~~1~~ to 3.5 1 to 3.5 1 to 3.5 1 to 3.5	**~~4.0~~ - 7.0 4.5 - 7.5 5.0 - 7.5 5.0 - 7.5	~~10500~~5200 5200 5200 5200	~~8000~~4000 4000 4000 4000
~~5~~A(AE)	**~~1-1/2~~" to No. 4 1" to No. 4 ¾" to No. 4	**~~0.53~~ 0.53 0.48	**~~470~~ 470 517	**~~1~~ to 3.5 1 to 3.5 1 to 3.5	**~~4.5~~ - 7.5 4.5 - 7.5 4.5 - 7.5	~~9000~~3900 3900 3900	~~7000~~3000 3000 3000
~~4A~~B or B(AE)	**	**~~0.62~~	**~~376~~	**~~2~~ to 5	**~~--~~ 3.0 - 6.0	~~7800~~3250	~~6000~~2500
~~3A(AE)~~	**	**	**	**	**	~~6500~~	~~5000~~
~~AA(AE)~~	~~2 to No. 4~~ ~~1-1/2 to No. 4~~ ~~1 to No. 4~~ ~~3/4 to No. 4~~	~~0.44~~ ~~0.44~~ ~~0.44~~ ~~0.44~~	~~564~~ ~~564~~ ~~611~~ ~~611~~	~~1 to 3.5~~ ~~1 to 3.5~~ ~~1 to 3.5~~ ~~1 to 3.5~~	~~4.0 - 7.0~~ ~~4.5 - 7.5~~ ~~5.0 - 7.5~~ ~~5.0 - 7.5~~	~~5200~~ ~~5200~~ ~~5200~~ ~~5200~~	~~4000~~ ~~4000~~ ~~4000~~ ~~4000~~
~~A(AE)~~	~~1-1/2 to No. 4~~ ~~1 to No. 4~~ ~~3/4 to No. 4~~	~~0.53~~ ~~0.53~~ ~~0.48~~	~~470~~ ~~470~~ ~~517~~	~~1 to 3.5~~ ~~1 to 3.5~~ ~~1 to 3.5~~	~~4.5-7.5~~ ~~4.5-7.5~~ ~~4.5-7.5~~	~~3900~~ ~~3900~~ ~~3900~~	~~3000~~ ~~3000~~ ~~3000~~
~~B or B(AE)~~		~~0.62~~	~~376~~	~~2 to 5~~	~~--~~ ~~3.0-6.0~~	~~3250~~	~~2500~~
~~C or C(AE)~~		~~0.70~~	~~376~~	~~2 to 5~~	~~--~~ ~~3.0-6.0~~	~~2600~~	~~2000~~

~~** Design~~* Values listed represent in-place air content. Make necessary adjustments for impacts to air content due to placement.

** For *f*'c over 4000 psi, design and proportion mixes according to ACI Manual of Concrete Practice 301: Specifications for Concrete and project specific criteria.

B. Minimum strength is based on a coefficient of variation of 10 percent, and one test below the minimum strength per 100 tests.

C. Maximum nominal size of coarse aggregate:

1. Not larger than $^1/_5$ of the narrowest dimension between sides of forms.

2. Not larger than 1/3~~1/3~~ the depth of slabs.
3. Not larger than ~~3/4~~¾ ~~-~~of the minimum clear distance between reinforcing bars or between bars and forms, whichever is least.

D. Do not exceed water/~~cement~~cementitous ratio.

E. ~~When a Pozzolan is used in the mix, calculate~~Calculate the water/~~cement~~cementitous ratio (w/c) according to the following formula:

$$\frac{W}{C} = \frac{Water}{Cement + Pozzolan}$$

F. When concrete is deposited in water, use 94 lb~~s.~~ more cement per cubic yard than the design requires for concrete placed above water.

G. ~~When not using water-reducing admixtures, use~~Use Table ~~3~~4 to determine the slump requirements~~.~~ when not using water-reducing admixtures or viscosity modifying admixtures.

1. Slump requirements when using low range water reducers: 1 inch to 5 inches for all classes of concrete.
2. Slump requirements when using high range water reducers: 4 inches to 9 inches for all classes of concrete.

~~**3.3 ADDITIONAL REQUIREMENTS FOR USING HIGH RANGE WATER REDUCERS (SUPER PLASTICIZERS)**~~

~~A. Establish the effective life of the High Range Water Reducer (HRWR) by trial batch.~~

~~1. Trial batch will approximate field conditions including time of placement (Refer to article 3.7, paragraph A.), and concrete temperature.~~
~~2. Engineer witnesses the trial batch.~~
~~3. Slowly agitate the mix throughout the test period.~~
~~4. Record and plot slump and mix temperature at 15-minute intervals. Maintain the required slump (4 to 9 inches) throughout the time allowed for placement. Re-dose if necessary.~~
~~5. If re-dosing is required, record the time of re-dose and the amount of admixture added.~~
~~6. Do not exceed any manufacturers recommendations for the use of the HRWR.~~
~~7. Submit results of the trial batch to the Engineer.~~

~~B. High Range Water Reducer (HRWR) may be added at the job site.~~

~~1. Record on the batch ticket, the time the HRWR was added.~~
~~2. Maintain the mixing period for truck mixers between 70 and 100 revolutions at mixing speed.~~

3. Engineer conducts a standard slump test before adding the HRWR to a transit mixer. Meet the Slump requirements of Table 3.
4. Engineer conducts additional slump tests at the job site after adding the HRWR.

C. If the HRWR is added to a central mixer, no preliminary slump test is required.

D. Show on batch tickets the amount of admixture used.

E. Do not exceed the requirements established by the trial batch.

F. Contractor is responsible for changes in placement and finishing operations due to the addition ofwhen using viscosity modifying admixtures: None. Meet visual stability index of 0 – 1.

3.4 ADDITIONAL REQUIREMENTS FOR USING SET RETARDING ADMIXTURES

A. If set retarding admixtures are specified due to haul times exceeding the time limitations in article 3.7, paragraph A, establish the effective life of the set-retarding admixture by trial batch.
1. The trial batch will approximate field conditions including concrete mix temperature.
2. Engineer witnesses the trial batch.
3. Slowly agitate the mix throughout the test period.
4. Record and plot slump and mix temperature at 15-minute intervals.
5. Do not exceed any manufacturers recommendations for the use of the set-retarding admixture.
6. Do not re-dose the concrete with additional set retarding admixture.
7. Submit results of the trial batch to the Engineer.

B. Add set retarding admixture at the batch plant at the time of initial batching operations, or immediately after.

C. Show on batch tickets the amount of admixture used.

D. Time of placement is established by the trial batch and supersedes the requirements in article 3.7, paragraph A.

E. Do not exceed the requirements established by the trial batch.

F. Contractor is responsible for changes in placement and finishing operations due to the addition of admixtures.

~~3.5~~ BATCHING MATERIALS

A. Meet AASHTO M 157.

B. Meet the requirements of the UDOT Quality Management Plan for Ready-Mix Concrete.

C. ~~Operate the batch mixer at the manufacturer's recommended drum speed.~~

~~D. Keep drums and blades free from excessive cement and mortar buildup.~~

~~E. Add the admixtures separately to the mix water.~~

~~F. Do not use any process, which will cause "flash set" of the mix.~~

~~G. At central mix plants, mix all materials for at least 80 seconds at recommended drum speed.~~

~~1. When adding more water or cement, mix 30 additional seconds.~~

~~2. Introduce the cement into the batcher before the fly ash.~~

~~H. Conduct mixing efficiency tests as specified.~~

~~1. AASHTO M 157, Annex A-1.~~

~~2. Engineer may order mixing efficiency tests at the beginning of concrete operations, or anytime deemed necessary.~~

~~I. Maintain the mixing period for truck mixers between 70 and 100 revolutions at mixing speed.~~

~~1. Maintain a minimum of 90 revolutions for front-end discharge trucks.~~

~~2. Complete concrete mixing before the truck leaves the batch plant yard.~~

~~J.~~ Hand Mixing:

1. Only Class B ~~and C~~ concrete may be hand mixed.
2. Hand-mixed batches cannot exceed 0.5 ~~cubic yard~~yd^3.
3. Hand mix on a watertight platform.
4. Spread the aggregate evenly on the platform, and thoroughly mix in the dry cement until the mixture becomes uniform in color.

~~3.6 TRANSPORTING~~

~~A. Transport ready-mixed concrete in transit mixers or agitator trucks.~~

D. Truck-Mixed Concrete (Dry-Batch):

1. Do not load trucks in excess of their rated mixing capacity, or 63 percent of the drum gross volume, or less than 2 ~~cubic yards~~yd^3.
2. The truck rating plate must be readable.

~~B. Equip transit mixers or agitator trucks with a visible water meter and revolution counter (electronic or mechanical). Use the water meter to measure all water discharged from the tank of the truck.~~

~~C. Obtain approval to add water after the transit mixer or agitator truck leaves the batch plant.~~

~~1. Add water within the specified time limits.~~

~~2. Do not add more water than the batch ticket indicates.~~

~~3. Do not add water after more than 0.5 cubic yard of concrete has been discharged from the drum and do not exceed the water/cement ratio.~~

~~4. When adding water, rotate the drum at least 30 revolutions at the mixing speed recommended by the manufacturer.~~

~~3.7~~ LIMITATIONS - GENERAL

A. Timing. ~~Reject~~ Unless otherwise specified, place concrete ~~if~~:

1. ~~It is not placed within~~Within 90 minutes of batching when the air temperature is below 80 ~~-~~degrees F.
2. ~~It is not placed within~~Within 75 minutes of batching when the air temperature is between 80 and 85 degrees F.
3. ~~It is not placed within~~Within 60 minutes of batching when the air temperature is between 86 and 90 degrees F.
4. ~~Initial set has developed.~~

~~B. Do not temper concrete by adding water or by any other means after~~ Prior to initial set ~~or false set has taken place~~.

~~C~~B. Concrete Temperature: Unless otherwise specified, place concrete in the forms when the concrete temperature is between 50 and 90 degrees F.

~~2. Do not place concrete when the mix temperature exceed 90 degrees F.~~

~~3. Refer to articles 3.8 and 3.9.~~

~~D~~

C. Pumping and Conveying Equipment

1. Do not use equipment, or a combination of equipment and the configuration of that equipment, that causes a loss of entrained air content that exceeds one half of the range of air content allowed by specification.
2. ~~At the direction of the Engineer,~~ Contractor is responsible for verification and~~/or~~ monitoring of air loss.

~~3.8 LIMITATIONS - COLD WEATHER~~3.5 CYLINDER STORAGE DEVICE

A. ~~Cold weather limitations apply when the temperature is likely to fall below 40 degrees F within 14 days of placement.~~

~~B. Comply with the following regulations for placing concrete in cold weather:~~

~~1. Submit a written plan for approval 14 calendar days before concrete placement.~~
~~2. Do not use chemical additives in the concrete to prevent freezing.~~
~~3. Provide all necessary cold weather protection for in-place concrete (cover, insulation, heat, etc.).~~
~~4. Do not place concrete in contact with frozen surfaces.~~
~~5. Produce concrete with a temperature between 60 degrees F and 90 degrees F at the time of placing.~~
~~6. Adequately vent combustion-type heaters that produce carbon monoxide.~~
~~7. Maintain the concrete temperature above 50 degrees F for the first 14 days after placing.~~
~~8. Protect the concrete from freezing until a compressive strength of at least 3,500 psi has been achieved.~~
~~9. Maintain moist conditions for exposed concrete not in contact with forms; avoid loss of moisture from the concrete due to heat applied.~~
~~10. Limit the drop in temperature next to the concrete surfaces when removing heat to 20 degrees F during any 12-hour period until the surface temperature of the concrete reaches that of the atmosphere.~~
~~11. Determine the concrete temperature with a surface thermometer insulated from surrounding air.~~

~~C. Paving:~~

~~1. Submit a written plan for approval 14 calendar days before concrete placement.~~
~~2. Paving may begin when base surface temperature is 36 degrees F in the shade and ascending.~~
~~3. Maintain the mix temperature at a minimum 60 degrees F.~~
~~4. Cease operations when the ambient temperature is 45 degrees F in the shade and decreasing.~~
~~5. Do not add chemical admixtures to prevent freezing.~~

6. Remove and replace concrete damaged by frost action at no additional cost to the Department.
7. Do not use material containing frost or lumps.
8. Do not heat water or aggregate to more than 150 degrees F.
9. Protect the concrete from freezing until a compressive strength of at least 3500 psi has been achieved.

3.9 LIMITATIONS - HOT WEATHER

A. Cool all form surfaces that will come in contact with the concrete to below 95 degrees F.

B. Paving: Discontinue paving when mix temperature reaches 90 degrees F either at point of placement or batch plant platform, or when ambient air temperature exceeds 100 degrees F in the shade.

3.10 LIMITATIONS SURFACE EVAPORATION

A. Surface evaporation limitations apply and may occur at any time of the year, when any combination of air temperature, relative humidity, and wind velocity, that have the potential to impair the quality of fresh or hardened concrete or otherwise result in abnormal properties. Submit a written plan for approval 14 calendar days before concrete placement that shows proper attention will be given to ingredients, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures and water evaporation that could impair strength or serviceability of the concrete. Refer to ACI 305R.

B. The surface evaporation plan may include any of the following actions:
1. Construct windbreaks or enclosures to effectively reduce the wind velocity throughout the area of placement.
2. Use fog sprayers upwind of the placement operations to effectively increase the relative humidity.
3. Reduce the temperature of the concrete by shading the material storage area or production equipment, cool aggregate by sprinkling, cool aggregate and/or water by refrigeration or by replacing a portion or all of the mix water with flaked or crushed ice to the extent that the ice will completely melt during mixing of the concrete.
4. Adjustment of the placement schedule.
5. Use of an approved water-based mono-molecular polymer liquid evaporative reducer at application rates recommended by the manufacturer. Not to be used as a finishing aid.

~~3.11 FIELD QUALITY CONTROL - SAMPLING~~

~~A. Engineer conducts sampling and testing.~~

~~1. When testing concrete from a concrete pump, Engineer takes the samples from the hose after all of the priming grout has been wasted.~~

~~2. When testing concrete used on bridge decks, Contractor places a small pile of concrete in front of the deck screed and provides suitable access for the Engineer to obtain samples.~~

~~B.~~ Provide and maintain cylinder storage device~~s to control the temperature within the specified range~~.

1. Maintain cylinders at a temperature range of 60 degrees F to 80 degrees F for the initial 16-hour curing period.
2. Do not move the cylinders during this period.
3. Equip the storage device with an automatic 24-hour temperature recorder, ~~that~~which continuously records on a time-temperature chart, with an accuracy of ±1 degree F.
4. Have the storage device~~s~~ available at the point of placement at least 24 hours before placement.
5. Engineer stops placement of concrete if the storage device cannot accommodate the required number of test cylinders.
6. Use water containing hydrated lime if water is to be in contact with cylinders.
7. A 24-hour test run may be required.

~~C. Do not place concrete without approval.~~

~~D. Cure cylinders representing steam-cured concrete as specified. Leave the cylinders with the product while steam is applied and then standard cured for the remaining 28 days. AASHTO T 23.~~

END OF SECTION

Standards Committee Submittal Sheet

Name of preparer: Degen Lewis
Title/Position of preparer: Concrete Engineer
Specification/Drawing/Item Title: Concrete Curing
Specification/Drawing Number: 03390

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

The entire specification was reviewed and updated. Most significant change was the removal of references to the UDOT Accepted (Qualified or Approved) Products List. All requirements for products are now shown in the specification. Other sections were changed to reflect current practice or equipment (e.g. radiant heat, multiple noise wall finishes).

Incorporates Structures Special Provision.

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

There are no changes required to the M&P.

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below. Indicate if no comments were received.

Note: There is a two-week response time set for this item.

Emailed to both on May 17, 2007

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)

None.

ACEC Comments: (Use as much space as necessary.)

None.

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)

Emailed to the District Engineers, Region Materials Engineers, and Region Pavement Engineers on May 17, 2007.

From the Structures Division:
"The AASHTO LRFD Bridge Construction Specification requires that concrete containing 10 percent or more of pozzolan have a minimum cure time of ten days."

Changed 3.2.A.5 to read ". . . continuously for ten days after placement."
Changed 3.2.B.6 to read ". . . before the ten-day curing expires."

Contractors (Any additional contacts beyond "C" above.)

Emailed to Ty Wadsworth at Ralph L Wadsworth Construction on May 17, 2007.

Hand delivered to Arvil Evans at Hansen (formerly Eagle) Precast on May 18, 2007.

Suppliers

None.

Consultants (as required) (Any additional contacts beyond “C” above.)

None.

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

Emailed on May 17, 2007.

Comment received
“Suggest the same level of detail for equipment requirements in Section 3.8 and 3.9 be applied to Section 3.2. Section 3.8 specifically calls out for a "fully atomizing mechanical sprayer with wind-protective hood" and both 3.8 and 3.9 discuss hand spraying small or inaccessible areas. This level of detail is not matched in other sections, specifically section 3.2, and should be.

Suggest the same level of detail for damage to the curing film in Section 3.8.B be applied throughout the section as relevant.”

Deleted the requirement for a “fully atomizing mechanical sprayer with wind-protective hood” from Article 3.8. The level of detail used in 3.2 and other sections is appropriate to the type of work described.

Added requirement to repair damaged curing compound to 3.5, 3.6, & 3.7.

Others (as appropriate)

None.

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)

None.

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)

None.

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

None required.

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.

None anticipated.

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).

None anticipated.

3. Life cycle cost.

None.

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)

Addresses changes to noise wall surfacing (i.e. we don't only have exposed aggregate finishes). Simplified submittals and testing requirements.

H. Safety Impacts?

None.

I. History? Address issues relating to the current usage of the item and past reviews, approvals, and/or disapprovals.

None.

Priority Explanation

Enter the appropriate priority in the box on the first page of the document.

Priority 1	Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.
Priority 2	Upon posting, this impacts projects being advertised.
Priority 3	Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

Supplemental Specification
2005 Standard Specification Book

SECTION 03390

CONCRETE CURING

Delete Section 03390 and replace with the following:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete curing materials and methods.

1.2 REFERENCES

A. AASHTO M 148: ~~Liquid Membrane-Forming Compounds~~Standard Specification for ~~Curing Concrete~~

~~B. ASTM C 156: Water Retention by Concrete Curing Materials~~

~~C. ASTM C 309:~~ Liquid Membrane-Forming Compounds for Curing Concrete

~~D.~~ B. AASHTO LRFD Bridge Construction Specifications

C. ASTM C 1315: Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

~~E. ASTM D 56: Test Method of Flash Point by Tag Closed Tester~~

~~F. ASTM D 2369: Test Method for Volatile Content of Coatings~~

~~G. ASTM D 2371: Test Method for Pigment Content of Solvent Reducible Paints~~

~~H. ASTM E 1347: Color and Color-Difference Measurement by Tristimulus (Filter) Colorimetry~~

1.3 SUBMITTALS

A. ~~For Concrete Curing Compound:~~Provide manufacturer's product data, specifications, and recommended installation instructions.

~~1. Provide a manufacturer's certificate of compliance as verification for all concrete work.~~

~~2. Provide the Engineer with test results before placing concrete pavement.~~

PART 2 PRODUCTS

2.1 CURING COMPOUND FOR STRUCTURAL AND ARCHITECTURAL CONCRETE

A. Meet AASHTO M 148, Type I D, Class A.

~~B. Meet applicable VOC air-pollution control requirements.~~

2.2 CURING COMPOUND FOR PORTLAND CEMENT CONCRETE PAVEMENT

A. ~~Select a curing compound from the Approved Products List (APL) maintained by the UDOT Research Division.~~

~~1.~~ Meet AASHTO M 148, Type 2, Class B.

~~2. Conform to the criteria in Table 1.~~

~~3. Resin type: Poly-alpha-methylstyrene (PAMS).~~

~~4. Do not use compounds that show significant phase separation within 24 hours after thorough agitation.~~

~~5. Meet applicable VOC air-pollution control requirements.~~

~~**Table 1**~~

~~**Characteristics (Curing compound for PCC)**~~	~~**Min.**~~	~~**Max.**~~	~~**ASTM**~~
~~Total Solids, percent by weight compound~~	~~35~~		~~D 2369 D 2371~~
~~TiO_2 Pigment, percent reflectance~~	~~60~~		~~E 1347~~
~~Drying Time:~~ ~~- Set to touch, min.~~ ~~- Track Free, min~~		 ~~60~~ ~~120~~	~~C 309~~
~~Coverage rate, ft^2/gal~~		~~100~~	
~~Water Loss, lb/ft^2 in 72 hours~~		~~0.06~~	~~C 156~~
~~Flash point, degrees F~~	~~50~~		~~D 56~~

2.3 CURING COMPOUND FOR LEAN CONCRETE BASE COURSE

A. ~~Select from the Qualified Products List maintained by UDOT Research Division.~~

~~1.~~ Use a curing compound with a wax base.

~~2~~

B. Meet AASHTO M 148, Type 2, Class A.

~~3. Meet applicable VOC air pollution control requirements.~~

2.4 CURING COMPOUND FOR CONCRETE BARRIER

A. ~~Select from the Accepted Products Listing maintained by UDOT Research Division.~~

~~1.~~ Meet ASTM C 1315, Type 1, Class A.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify concrete surfaces are ready for curing. ~~Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.~~

1. Complete all patching or surface finishing before applying compound.

B. Follow product manufacturer's recommendations for preparing surfaces.

C. ~~For newly placed concrete using membrane-curing compound method:~~

~~1. Deliver the curing compound in a ready-mixed form with the pigment uniformly disbursed without diluting or altering the compound. If the compound is chilled and too viscous, warm it to a maximum of 100 degrees F.~~

~~2.~~ Keep surfaces moist until the curing compound is applied.

~~3. Complete all patching or surface finishing before applying compound.~~

D. ~~For lean concrete base course curing:~~ Do not dilute or alter the compound.

3.2 CURING STRUCTURES

A. Bridge Decks~~,~~ and Approach Slabs~~, Curbs, and Parapets~~.

1. Apply membrane-curing compound at the manufacturer's recommended rate so that no portion of the deck or approach slab is exposed to the

atmosphere for more than 20 minutes after the tining or finishing operation.

2. Apply membrane-curing compound at a uniform rate of 100 ft^2/gal.
3. Work bridge to follow immediately after the finishing machine to allow application of the curing compound while the concrete is still plastic.
4. As soon as the concrete is sufficiently set to support the materials, cover bridge decks, approach slabs, curbs, and parapet walls with material that retains moisture and does not prevent evaporation, such as cotton or burlap mats.
   a. ~~Restrain~~Secure the cotton or burlap mats to prevent wind or other forces from removing them.
   b. Do not damage the finish.
5. Keep entire concrete ~~moist~~damp continuously for ~~seven~~ten days after placement. ~~Keep the entire surface damp, but do~~Do not ~~wash away or~~ erode or damage the surface.

B. Other newly placed concrete: Use membrane-curing compound method.
1. Keep surfaces ~~wet and~~ moist until the curing compound is applied.
2. Complete all patching or surface finishing before applying compound.
3. Warm chilled compound that is too viscous to a maximum of 90 degrees F.
4. Apply curing compound immediately after finishing operations are completed
5. Spray the entire surface of the concrete with a membrane curing compound at a uniform rate of 100 ft^2/gal.
6. Immediately re-spray any portion damaged before the ~~seven~~ten-day curing expires.

3.3 CURING CURB, GUTTER, FLATWORK, SIDEWALK, DRIVEWAY, AND OTHER MISC CONCRETE ITEMS (CONCRETE SLOPE PROTECTION)

A. Refer to this Section, article 3.~~1, Preparation and article 3.~~2, ~~Curing Structures,~~ paragraph B, Other newly place concrete.

3.4 CURING PRE-STRESSED CONCRETE

A. Cure following this Section, article 3.2, ~~Curing Structures~~ or article 3.10, ~~Steam or Radiant Heat Curing,~~ until concrete has reached a strength of 4,000 psi or as designated on the plans.

3.5 CURING PRE-CAST CONCRETE BARRIER

A. Cure exposed surfaces immediately after finishing operations are completed.
1. Apply the curing compound at a rate of 100 ft^2/gal.

B. After removing form, broom clean the surface of the barrier and apply two coats of curing compound.
   1. Apply the first coat at a rate of 100 ft^2/gal.
   2. Allow the first coat to dry thoroughly before applying the second coat.
   3. Apply the second coat at a rate of 200 ft^2/gal.

C. Immediately repair any damage to the compound film occurring until seven days after the initial application at no additional cost to Department.

3.6 CURING CAST- IN- PLACE CONCRETE BARRIER

A. Cure immediately after finishing operations are completed.

B. Apply two coats of curing compound ~~as specified for~~following this Section, article 3.5~~, Curing Pre-cast Concrete Barrier~~.

C. Immediately repair any damage to the compound film occurring until seven days after the initial application at no additional cost to Department.

3.7 CURING PRE-CAST NOISE WALL

A. Apply curing compound to all exposed surfaces immediately after finishing and when forms are removed.
   1. Apply curing compound at a uniform rate of 100 ft^2/gal.

B. For exposed aggregate finishes.
   1. Cover surface of exposed aggregate noise wall panels with a moisture barrier or membrane immediately after initial finishing operations are completed.

   ~~B~~2. Leave cover in place until final finishing operations (exposed aggregate) are performed.

~~C. Remove cover, complete final finishing operations, and immediately apply curing compound.~~
   ~~1. Apply curing compound at a uniform rate of 100 ft^2/gal.~~
   ~~2. After removing from forms, apply curing compound to all surfaces not previously covered.~~

~~D. Cure all other precast noise wall components.~~
   ~~1. Apply curing compound to all exposed surfaces immediately after finishing or form removal operations are completed.~~

~~2~~3. Immediately apply curing compound upon removal of cover and completion of final finishing operations.

4. Apply curing compound at a uniform rate of 100 ft^2/gal.

C. Immediately repair any damage to the compound film occurring until seven days after the initial application at no additional cost to Department.

3.8 CURING LEAN CONCRETE BASE COURSE

A. After finishing operations are complete, apply curing compound.
1. Spray entire exposed area (top and sides) at a rate of 200 ft^2/gal.
2. ~~Use fully atomizing mechanical sprayers that have a wind-protective hood.~~
3. ~~3.~~ Hand spray on small areas and areas inaccessible to mechanical spraying equipment.
4. ~~4~~3. Provide complete coverage with curing compound at edges, corners, sides, and rough spots.

B. Damage to the film of curing compound occurring within 72 hours of application must be repaired immediately at no additional cost to Department.

3.9 CURING PORTLAND CEMENT CONCRETE PAVEMENT

A. ~~Pretest the liquid membrane curing compound using an infrared spectrometer to determine specification compliance~~Apply curing compound according to manufacturer's recommendations.

B. ~~Provide the Engineer with the test results before placing the concrete pavement.~~

~~C. Delay placing concrete pavement until an acceptable shipment of curing compound is received.~~

~~D. Warm viscous curing-sealing compound to a temperature not to exceed 100 degrees F if necessary.~~

~~E.~~ Thoroughly mix the compound ~~during use~~ and uniformly disperse the pigment ~~throughout the vehicle. Stir continuously mechanically~~ before and during application ~~and do not dilute or alter in any manner~~.

~~F~~C. Apply compound to the entire pavement surface and exposed edges immediately after completing finishing operations:
1. Apply the curing compound in two approximately equal applications.
2. Apply the second application in the opposite longitudinal direction as the first at a combined application rate equal to 100 ft^2/gal.
3. Allow at least 30 minutes between applications.

4. Small and irregular areas and areas inaccessible to mechanical spraying equipment ~~may~~will be hand sprayed.

~~G~~D. Stop paving operations if the application of the compound behind the paving machine is delayed until the problem is resolved.
1. Keep the pavement moist with water until the compound application process is resumed.
2. Apply the water in a fog-mist spray without damaging the pavement surface texture.

~~H~~E. Immediately repair any damage to the compound film occurring until seven days after the initial application at no additional cost to Department.

3.10 STEAM OR RADIANT HEAT CURING

~~A~~. Steam or radiant heat curing may only be used for products manufactured in an established plant.

~~1~~

B. Provide a complete steam or radiant heat curing system approved by the Engineer, including 24 hour temperature control and monitoring devices, and a suitable enclosure to contain live steam and minimize moisture and heat losses.

~~2~~

C. Comply with the requirements of the AASHTO LRFD Bridge Construction Specifications, section 8.11.

1. Do not apply ~~steam~~heat until the concrete has set. Wait four to six hours if retarders are used. If no retarders are used, wait two to four hours.
2. Heat may be applied to maintain a minimum temperature of 50 degrees F within the curing enclosure while waiting for the concrete to set.
3. Maintain 100 percent relative humidity in the ~~steam~~ curing enclosure.
4. Do not apply ~~steam~~heat directly on the concrete or cause localized high temperatures.
5. When applying ~~steam~~heat, increase the ambient air temperature at a rate not to exceed a 40 degrees F per hour until a temperature range of 140 degrees to a maximum160 degrees F is reached.
6. Maintain the temperature range until the concrete has reached the specified strength.
7. When discontinuing ~~the steam~~heat, decrease the ambient air temperature at a rate not to exceed a 40 degrees F per hour until reaching a temperature of not more than 20 degrees F above the air temperature to which the concrete will be exposed.
8. For prestressed members, transfer stressing force to the concrete immediately after heat curing has ceased.

END OF SECTION

Standards Committee Submittal Sheet

Name of preparer: Degen Lewis
Title/Position of preparer: Concrete Engineer
Specification/Drawing/Item Title: Penetrating Concrete Sealer
Specification/Drawing Number: 03392

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

The entire specification was reviewed and updated. Based on comments from the Structures Division most test requirements were superfluous. Manufacturer data sheet provides the relevant information.

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

There are no changes required to the M&P.

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below. Indicate if no comments were received.

Note: There is a two-week response time set for this item.

Emailed to both on May 18, 2007

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)

None.

ACEC Comments: (Use as much space as necessary.)

None.

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)

Emailed to the District Engineers, Region Materials Engineers, and Region Pavement Engineers on May 18, 2007.

From the Rod Terry, R1 Materials Engineer:
"Article 3.2.C is actually giving an acceptance criteria "...meet the minimum Friction Number of 40 for at least 90 percent..." This should be moved to an acceptance section that would also include testing frequencies."

From the John Butterfield, R2 Materials Engineer:
"Include a statement somewhere in the specification that Penetrating Concrete Sealers are not to be applied to PCCP. Then the entire issue of skid numbers goes away. If, for some misguided reason, someone wants to apply these sealers to PCCP, they will need to draft a Special Provision."

Changed 3.2.C and added second submittal to reflect comments above.

Contractors (Any additional contacts beyond "C" above.)

None.

Suppliers

None.

Consultants (as required) (Any additional contacts beyond “C” above.)

None.

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

Emailed on May 18, 2007. No comments.

Others (as appropriate)

None.

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)

None.

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)

None.

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

None required.

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.

None anticipated.

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).

None anticipated.

3. Life cycle cost.

None.

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)

Addresses changes to noise wall surfacing (i.e. we don't only have exposed aggregate finishes). Simplified submittals and testing requirements.

H. Safety Impacts?

None.

I. History? Address issues relating to the current usage of the item and past reviews, approvals, and/or disapprovals.

None.

Priority Explanation

Enter the appropriate priority in the box on the first page of the document.

Priority 1 Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.

Priority 2 Upon posting, this impacts projects being advertised.

Priority 3 Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

Supplemental Specification
2005 Standard Specification Book

SECTION 03392

PENETRATING CONCRETE SEALER

Delete Section 03392 and replace with the following:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and procedures for applying protective penetrating concrete sealer.

~~**1.2 RELATED SECTIONS Not Used**~~

1.32 REFERENCES

A. ~~AASHTO T 260: Sampling and Testing for Total Chloride Ion in Concrete and Concrete Raw Materials~~

~~B. ASTM C 267: Chemical Resistance of Mortars, Grouts, and Monolithic Surfacings and Polymer Concretes~~

~~C. ASTM C 666: Resistance of Concrete to Rapid Freezing and Thawing~~

~~D.~~ ASTM E 274: Standard Test Method for Skid Resistance of Paved Surfaces Using a Full-Scale Tire

~~**1.3 4 DEFINITIONS Not Used**~~

1.53 SUBMITTALS

A. ~~Certificate of Compliance to the Engineer or the Construction and Materials Division~~Manufacture's product data, specifications, and recommended installation instructions.

B. ~~One quart of the product to the Engineer.~~Certification of a minimum Friction Number of 40 for at least 90 percent of friction numbers. Refer to ASTM E 274.
1. Applies only to traveled way surfaces where the plans require sealer.

PART 2 PRODUCTS

2.1 PENETRATING CONCRETE SEALERS

A. Choose from the following list:
1. Silane
2. Siloxane
3. Silicate
4. Siliconate
5. Organo Silane Ester
6. Styrene Acrylic Copolymer
7. Organo Siloxane
8. Alkylalkoxy Siloxane
9. Alkylalkoxy Silane

~~B. Comply with requirements of Table 1:~~

~~**Table 1**~~

~~**Penetrating Concrete Sealer Requirements**~~				
~~*** Properties**~~	~~**Requirements**~~	~~**ASTM**~~	~~**AASHTO**~~	~~**** UDOT**~~
~~Accelerated Weathering~~	~~As Specified~~	~~C 666~~	~~T 260~~	
~~Freeze-thaw Test Medium~~	~~Less than or equal to 3 percent Road Salt~~			~~Sealer Studies~~
~~Minimum Depth Penetration~~	~~Greater than or equal to 3/16 inches~~			~~Sealer Studies~~
~~Freeze-thaw Weight Loss~~	~~Less than or equal to 6 percent 300 Cycles~~			~~Sealer Studies~~
~~Chemical Resistance~~	~~Subsections: 1.1.2 1/1/3~~	~~C 267~~		
~~Friction Number~~	~~Greater than or equal to 40~~	~~E 274~~		
~~Infrared Spectrogram~~	~~Materials Division Base Comparison~~			~~Materials Studies~~

~~* Certified test results from a private accredited testing laboratory will suffice for acceptance.~~

~~** Utah Department of Transportation, Materials and Research Division concrete sealer studies of 1986 and 1990.~~

PART 3 EXECUTION

3.1 PREPARATION

A. Keep surfaces dry and free of laitance, dirt, dust, paint, grease, oil, rust, and other contaminants.

B. Remove any curing compound from the surface of the concrete before applying penetrating sealer.

C. Use one of the following cleaning methods:
1. Hydroblasting - 700 psi min.
2. Shotblasting
3. Sandblasting
4. Etching

D. Keep concrete surface matrix intact without exposing any large aggregate.

E. Cure concrete for 28 days ~~prior to~~before sealer application.

F. ~~Place the material after obtaining the~~Obtain approval from the Engineer before applying material.

3.2 APPLICATION

A. Application Rate:
1. ~~Based upon the residue content at a coverage rate of 0.11 lbs/yd^2.~~
~~2.~~ Apply according to ~~manufacturers recommendation~~manufacturer's recommendations for each of the following surfaces:
a. Horizontal
b. Vertical
c. Overhead

B. Application Drying Time: Select a sealer with maximum drying time of 1½ hours.

C. ~~Upon~~Do not apply sealer to Portland Cement Concrete Pavement (PCCP). When plans specify application to other traveled way surfaces such as approach slabs, bridge decks, etc., meet the minimum Friction Number of 40 for at least 90 percent of friction numbers. Refer to ASTM E 274.

END OF SECTION

Standards Committee Submittal Sheet

Name of preparer: Degen Lewis
Title/Position of preparer: Concrete Engineer
Specification/Drawing/Item Title: Concrete Pavement Details for Urban and Interstate
Specification/Drawing Number: PV-4

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

1) Eliminated lane width dimensions on Load Transfer Detail to make the drawing universally applicable to varying lane widths (e.g. 14’ single lane ramps and 12’ mainline travel lanes).
2) Eliminated load transfer bars from the center of the lane in the Load Transfer Detail. Research and experience has shown that even if the center portion of the lane carries a direct wheel load (wheel path), the area of the panels and distance from the longitudinal joints allows the panel to transfer the load without the bar. Eliminating these bars will save the Department money.
3) Rearranged and relabeled drawing details to emphasize standard concrete paving details. There has been some confusion in recent projects as to what is “required.”
4) Added table to identify needed variation in load transfer bar size based on pavement thickness. This will clarify this issue for contractors and designers.
5) Added detail for a removal method that does little damage to adjoining pavement panels.
6) Eliminated repetition in detail callouts and symbol keys.
7) Created general drawing notes to remove comments from each detail and accommodate the reduction in the detail symbol keys.

8) Changed “epoxy coated” references to “corrosion resistant” to reflect changes in the reinforcing steel specification in response to new technologies on the market.
9) Rearranged Panel Replacement Detail to clearly identify different joints and minimum panel replacement sizes.
10) Increased symbol size for joints in the Panel Replacement Detail to clearly indicate the differences in bar types.

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

There are no changes required to the M&P.

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below. Indicate if no comments were received.

Note: There is a two-week response time set for this item.
Emailed to both on May 10, 2007

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)

None received.

ACEC Comments: (Use as much space as necessary.)

None received.

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)
The revised drawing was emailed to the Region Materials Engineers on May 8, 2007 and to the Region Pavement Engineers, Region Traffic Engineers, and Region District Engineers on May 10, 2007.

No comments received.

Contractors (Any additional contacts beyond “C” above.)

None.

Suppliers

None.

Consultants (as required) (Any additional contacts beyond “C” above.)

None.

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

Emailed on May 10, 2007. No comments received.

Others (as appropriate)

None.

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)

None.

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)

None.

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

None required.

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.

   The elimination of two load transfer bar from each standard 12 foot travel lane will have a decrease in the cost of concrete paving.

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).

   Following the panel removal detail will decrease the inadvertent (and difficult to repair) damage done to adjacent panels during removal. This should be particularly useful for permit work on concrete pavements.

3. Life cycle cost.

   The decrease in steel quantity should lower the initial and life cycle cost with no impact to long term performance.

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)

   As described in preceding sections.

H. Safety Impacts?

   None.

I. History? Address issues relating to the current usage of the item and past reviews, approvals, and/or disapprovals.

   Nothing more than as described in part A above.

Priority Explanation

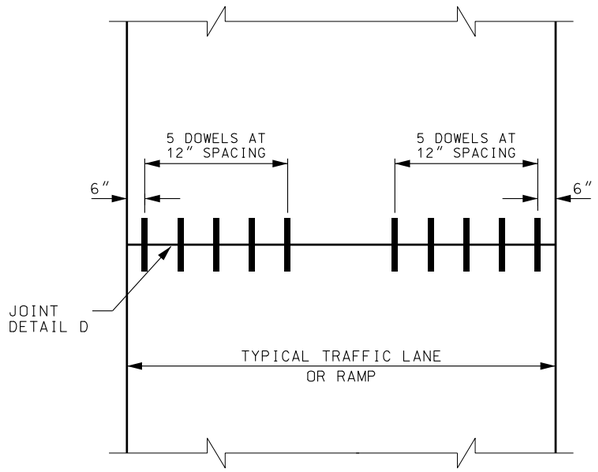
Enter the appropriate priority in the box on the first page of the document.

Priority 1 Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.

Priority 2 Upon posting, this impacts projects being advertised.

Priority 3 Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

STANDARD PCC PAVING



LOAD TRANSFER DOWEL BAR LAYOUT

NOTES:

1) ALL BARS ARE CORROSION RESISTANT PER SECTION 03211.

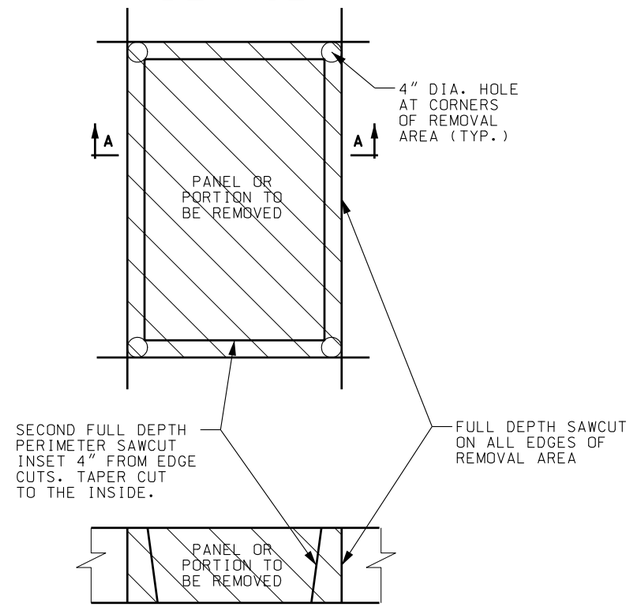
2) ALL TIE BARS ARE DEFORMED REBAR.

3) ALL DOWEL BARS ARE SMOOTH.

4) MAKE FULL DEPTH SAWCUT AROUND ALL EDGES OF PANELS OR PORTIONS REPLACED. MINIMIZE OVERCUT INTO ADJACENT PANELS.

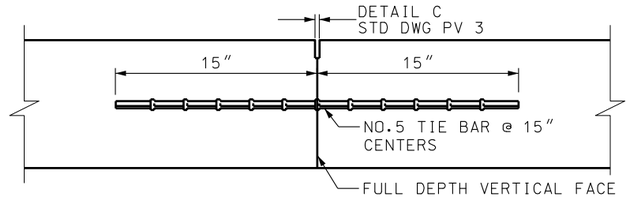
5) WHEN REPLACING A PARTIAL PANEL, IF THE WIDTH OF REMAING PORTION IS LESS THAN THE MINIMUM SHOWN, THEN REPLACE THE ENTIRE PANEL.

PANEL REMOVAL DETAIL

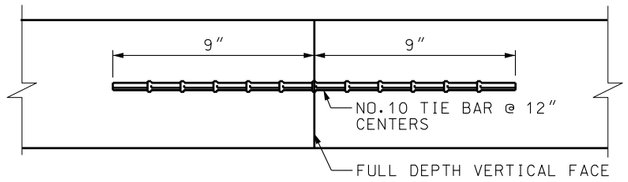


SECTION A-A

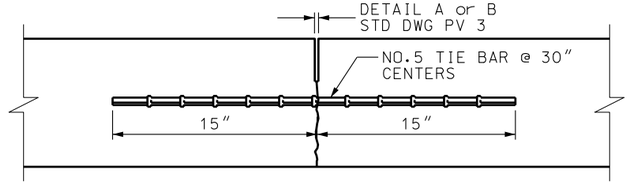
JOINT SECTION DETAILS



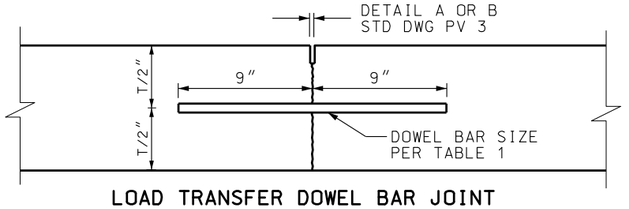
LONGITUDINAL CONTACT JOINT
DETAIL "A"



MID-PANEL CONTACT JOINT
DETAIL "B"



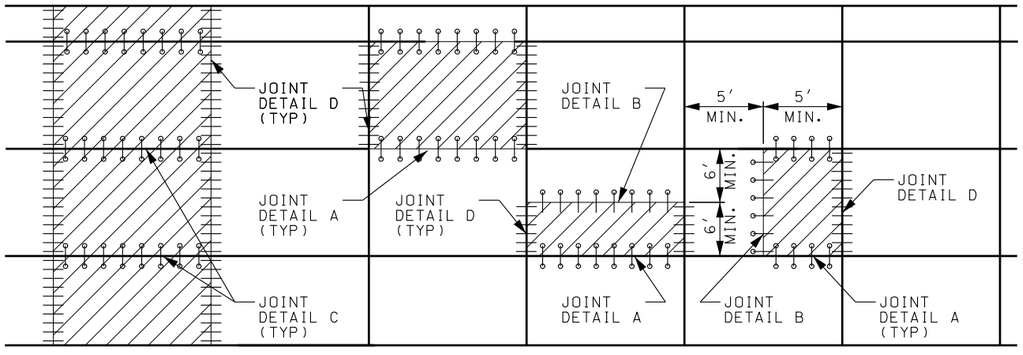
SAWED LONGITUDINAL JOINT
DETAIL "C"
(T/3 SAW CUT W/ AGGREGATE INTERLOCK BELOW)



LOAD TRANSFER DOWEL BAR JOINT
DETAIL "D"

INSTALL DOWEL BARS PARALLEL TO THE CENTERLINE AND TO THE PAVEMENT SURFACE. LIMIT DEVIATIONS FROM PARALLEL TO ± 1/4" IN THE LENGTH OF THE DOWEL BAR.

TYPICAL PAVEMENT PANEL REPLACEMENT



TIE BARS - SEE DETAIL "A" OR "C"

TIE BARS - SEE DETAIL "B"

DOWEL BARS - SEE DETAIL "D"

TABLE 1	
PAVEMENT THICKNESS	DOWEL BAR SIZE
8"- 9.5"	NO.8
10" - 11.5"	NO.10
12" OR GREATER	NO.12

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

RECOMMENDED FOR APPROVAL — JUN.28.2007 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — JUN.28.2007 DATE
DEPUTY DIRECTOR

CONCRETE PAVEMENT DETAILS FOR URBAN AND INTERSTATE

STANDARD DRAWING TITLE

STD DWG
PV 4

Doc
Page
180

DGN File:L:\Standard Drawings\Imperial\2005Working\+_StandardsCommitteeFiles\June07\PV04.dgn

12-JUN-2007

Standards Committee Submittal Sheet

Name of preparer: John Butterfield/Tim Biel
Title/Position of preparer: Region Two Materials Engineer/Engineer for Materials
Specification/Drawing/Item Title: Microsurfacing
Specification/Drawing Number: 02735

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

Rewrite and submission of current special provision based on changing some format regarding submittals and addressing some mix design and sampling procedures.

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

No change.

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below. Indicate if no comments were received.

Note: There is a two-week response time set for this item.

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)

See Below

ACEC Comments: (Use as much space as necessary.)

Responded with No comments

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)

Desna Bergold, Region Two

Construction Engineers

Karl Verhaeren

Contractors (Any additional contacts beyond “C” above.)

Has gone through Utah Pavement Council, including representatives from Staker-Parsons, Geneva, Granite

Suppliers

Rusty Price, ISS – Part of original rewrite

Consultants (as required) (Any additional contacts beyond “C” above.)

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

Others (as appropriate)

RME Group approved

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)

   Changes are attached.

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)

   No change

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

   Publishing the specification, notice will be given at Pavement Council.

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.

   If anything, price will go down due to reduced handling.

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).

   Currently no change.

3. Life cycle cost.

   Should be increase due to elimination of marginal and inconsistent mix designs

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)

Less workload and better timing for Region Field personnel.

H. Safety Impacts?

None

I. History? Address issues relating to the current usage of the item and past reviews, approvals, and/or disapprovals.

Document has been a special provision for at least three years. Changes were requested, in part, by industry to improve the mix design process and bring more in line with national procedures.

Priority Explanation

Enter the appropriate priority in the box on the first page of the document.

Priority 1	Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.
Priority 2	Upon posting, this impacts projects being advertised.
Priority 3	Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

~~July 24, 2006~~~~May 2, 2007~~

Supplemental Specification
2005 Standard Specification Book

SECTION 02735

MICRO-SURFACING

Add Section 02735:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products and procedures for mixing and spreading a properly proportioned mixture of aggregate, mineral filler, additives, polymer-modified asphalt emulsion, and water.

B. Products and procedures for a cured mixture with a homogeneous appearance, a firm surface adhesion, and a skid resistant texture.

~~———~~1. Provide a micro-surface mixture that is capable of being spread in variable thickness cross-sections (ruts, scratch courses, and surfaces).

~~1.2 RELATED SECTIONS~~1.2 RELATED SECTIONS

~~A. Section 02745: Asphalt Material~~
A. Section 02746: Hydrated Lime

1.~~3~~2 REFERENCES

A. AASHTO M 17: Standard Specification for Mineral Filler for Bituminous Paving Mixtures

~~B. AASHTO M 29: Standard Specification for Fine Aggregate for Bituminous Paving Mixtures~~ (Note: Not found in text. Delete here or add in text. Renumber as required.)

~~C. AASHTO M 85: Portland Cement~~

D. AASHTO M 208: Standard Specification for Cationic Emulsified Asphalt

~~E. AASHTO T 2: Sampling of Aggregates~~

~~F~~E. AASHTO T 11: Materials Finer Than 75 µm (No. 200) Sieve in Mineral Aggregate

~~F~~G. ~~AASHTO T 19: Unit Weights and Voids in Aggregate~~ (Note: Not found in text. Delete here or add in text. Renumber as required.)

G~~H~~. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates

H~~I~~. AASHTO T 49: Penetration of Bituminous Materials

I~~J~~. AASHTO T 53: Softening Point of Bitumen

J

~~J~~. AASHTO T 59: Testing Emulsified Asphalts

~~K. AASHTO T 89: Determining the Liquid Limit of Soils~~

~~L. AASHTO T 90: Determining the Plastic Limit and Plasticity Index of Soils~~

~~M~~K. AASHTO T 96: Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

L~~N~~. AASHTO T 104: Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate

~~O. AASHTO T 112: Clay Lumps and Friable Particles in Aggregate~~

M~~P~~. AASHTO T 176: Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test

O~~Q~~. ~~AASHTO T 201: Standard Test Method for Kinematic Viscosity of Asphalt (Bitumens)~~

~~R.~~ AASHTO T 278: Surface Frictional Properties Using the British Pendulum Tester

~~S~~P~~R~~. AASHTO T 279: Accelerated Polishing of Aggregates Using the British Wheel

~~T.~~S ~~AASHTO T 308: Determining the Asphalt Binder Content of Hot-Mix Asphalt (HMA) by the Ignition Method~~

~~T. AASHTO T 316: Viscosity Determination of Asphalt Binder Using Rotational Viscometer~~AASHTO T 316: Viscosity Determination of Asphalt Binder Using Rotational Viscometer (Note: Can't delete. Added in Table 1.)

~~U. AASHTO TP 61: Determining the Percentage of Fractured Particles in Coarse Aggregate~~

QV. ASTM D 6372 ~~-99a~~: Standard Practice for Design, Testing and Construction of Micro-Surfacing

RW. ISSA A 143 Guidelines (~~Revised May 2005~~Current edition)

SX. ~~UDOT Materials Manual of Instruction~~ (Note: Not found in text. Delete here or add in text. Renumber as required.)

TY. UDOT Minimum Sampling and Testing Requirements

~~1.~~1.~~4~~3 ~~CONTRACTOR~~ SUBMITTALS ~~MINIMUM SAMPLING AND TESTING REQUIREMENTS~~

~~A. Contractor Submittals~~

~~1.~~ Mix Design, Provide the Engineer with Mix Design 10 days prior to beginning construction.

1. Meet requirements of this ~~s~~Section, ~~A~~article 2.6. ~~ASTM D 6372-99a~~

~~a. Test results for job mix design, ISSA A143.~~

~~1) Wet Cohesion: 30 minute and 60 minute, ISSA TB 139~~

~~2) Excess Asphalt by LWT Sand Abrasion, ISSA TB 109~~

~~3) Wet Stripping, ISSA TB 114~~

~~4) Wet-track abrasion loss, one-hour soak and six day soak, ISSA TB 100~~

~~10)Lateral displacement, ISSA TB 147~~

~~11)Classification Compatibility, ISSA TB 144~~

~~12)Mix Time, ISSA TB 113~~

~~2.~~

B. Provide the Engineer with the following for asphalt~~-~~/~~-~~polymer emulsion with job-mix design.

1. Test report: ~~Emulsified Asphalt .Test Report~~

~~1) Meets AASHTO M 208~~

~~2) Penetration AASHTO T 49~~

~~7)Softening point AASHTO T 53~~

~~8)Minimum Residue AASHTO T 59 (modified)~~

~~9)Minimum rotational~~kinematic viscosity, ~~AASHTO T 209~~316Meet the requirements of this ~~s~~Section, article 2.1.

2. A sample of asphalt~~-~~/~~-~~polymer emulsion with job-mix design.

~~a.~~3.~~Sample of asphalt -/ polymer emulsion with job-mix design~~

~~c.~~ A ~~C~~certificate of analysis/compliance from the manufacturer for each shipment

4. Target gradation for combined aggregate and mineral filler.

5. Verify~~ication~~ asphalt/polymer emulsion supplier adheres to *UDOT* Minimum Sampling and Testing Requirements Section 508 Asphalt Emulsion Quality Management Plan.~~.~~

~~3~~C. Provide test reports for ~~M~~mineral ~~A~~aggregate.

1. ~~a. Test Reports~~

~~1) Sodium Sulfate Soundness, AASHTO T 104~~

~~2) Sand Equivalent AASHTO T 176~~

~~3)LA Wear AASHTO T 96~~

~~4)Polishing value, AASHTO T 278, T 279~~Meet the requirements of this ~~s~~Section, article 2.2.

~~4~~D. Provide verification that Hydrated Lime meets 02746.

E. Provide a Manufacturer's ~~Mineral Filler:~~ Certificate of Compliance for Mineral Filler~~materials meets AASHTO M 17~~.

~~5. Target gradation for combined aggregate and mineral filler.~~

~~6~~F. Provide ~~C~~calibration documentation ~~tha~~for each mixing unit~~t~~ that includes an individual calibration for each material at various settings, which can be related to the machines metering devices.

G. To make changes in the job-mix gradation:

1. Submit a written request for a change in the job-mix gradation.

2. Submit a new job-mix design if any changes in gradation are outside the gradation band allowed by the stockpile tolerance in Table 2.

~~7. Resident Engineer approved submittals.~~

~~B. Quality Assurance for aggregate stockpiles, performed by the Department~~

~~1. Aggregate stockpile sieve analysis, AASHTO T 2, T 27 / T 11~~

~~a. Stockpiles are approved a minimum of one and maximum of seven days prior to use.~~

~~b. One gradation per 500 tons of material (estimated) in stockpile.~~

~~c. Out of specification material will be rejected.~~

~~C. Documentation/Report~~

~~1. Verification asphalt/polymer emulsion supplier adheres to *UDOT Minimum Sampling and Testing Requirements* Section 508 Asphalt Emulsion Quality Management Plan from the UDOT website. Refer to http://www.udot.utah.gov/index.php/m=c/tid=719 for dated, signed, qualified list printout.~~

PART 2 PRODUCTS

2.1 EMULSIFIED ASPHALT

A. Use a CSS-1h, quick-set polymer-modified asphalt emulsion conforming to AASHTO M ~~208,~~208; delete the cement mixing test requirements.

B. Mill or blend the polymer material into the asphalt or emulsifier solution prior to the emulsification process.

C. ~~Submit a sample of the asphalt / polymer emulsion along with the job-mix design to the Engineer for approval.~~ The asphalt~~ / ~~polymer emulsion must parallel the standard from an established infrared spectrum characterizing the asphalt / polymer emulsion.

~~D. Provide a certificate of analysis/compliance from the manufacturer for each shipment of emulsified asphalt to the Engineer~~

D~~E~~. Modified Emulsion Residue, meet Table 1:

Table 1

TEST	DESCRIPTION	SPECIFICATION
AASHTO T 49	Penetration, 77°	~~50 – 80~~40-90
AASHTO T 53	Softening point	135° Min
AASHTO T 59 (modified (a))	F Residue by distillation	62% Min.
AASHTO T ~~201~~316	~~Kinematic~~Rotational Viscosity 275° F	650 ~~CST~~CPS
(a) Modified distillation procedure: Heat emulsion residue to ~~350~~270 ~~+~~± 10 degrees F and maintain that temperature for 20 minutes. Perform the distillation within 60 ~~+~~± ~~5~~15 minutes		

2.2 MINERAL AGGREGATE

A. Use 100 percent manufactured mineral aggregates that meet the following requirements:

1. Clean and free from organic matter, clay balls or other detrimental substances.
2. Maximum weighted sodium sulfate soundness loss of 15 percent. AASHTO T 104.
3. Maximum loss by abrasion of 30 percent. AASHTO T 96.
4. Sand equivalent of sixty or greater. AASHTO T 176
5. Minimum polishing value of 31. AASHTO T 278, T 279
   a. Performed on aggregate prior to crushing.
   b. Predominantly limestone or dolomite aggregates will not be accepted.

B. Select a job mix or target gradation within the gradation band. Base the mix design on this gradation. After the target gradation has been submitted the percent passing each sieve will not vary by more than the stockpile tolerance and still remain within the gradation band. AASHTO T 11, AASHTO T 27. Refer to Table 2.

Table 2
~~**Job-Mix Gradation Design Limits**~~

Job-Mix Gradation Design Limits		
Sieve Size	Broad Band Gradation Percent Passing	Stockpile Tolerances
3/8	100	0
#4	70-90	±5
#8	45-70	±5
#16	28-50	±5
#30	19-34	±5
#50	12-25	±4
#100	7-18	±3
#200	5-15	±2

2.3 MINERAL FILLER

~~———~~A. Use Portland Cement, hydrated lime, or aluminum sulfate as specified in AASHTO M 17

2.4 WATER

A. Use water that is potable and free from harmful salts or reactive chemicals and any other contaminants.

2.5 ADDITIVES

A. Use additives as required to accelerate or retard the break-set of the micro-surface mix, to improve the resulting finished surface, or to increase adhesion
   1. Determine the initial additive quantities from the mix design for the micro-surface mix or individual materials.
   2. Use additives that are compatible with the other components of the mix.
   3. Obtain Engineer approval for use of additives.

2.6 JOB-MIX DESIGN

~~A. Provide the Engineer with test results and the proposed mix design from a UDOT approved laboratory 10 days prior to beginning construction.~~

~~1~~A. Design in accordance with ASTM D 6372-99a
   ~~2~~1. Show each ingredient amount:

a) Residual asphalt cement content, within 7.5 ± 2 percent~~%~~ by dry total weight of aggregate.
b) Aggregate gradation (target) within the job-mix gradation design limits in Table 2.
c) Mineral filler, percentage by total dry weight of aggregate.
d) Polymer modifier 2.5 percent~~%~~ minimum polymer solids based on the residual asphalt content.

~~3~~2. Identify additives as determined by design testing to control mix set times and adhesion.
a) Provide acceptable percent limits for additives.

~~4~~3. Conform to the ISSA A143 specifications listed in Table 3.

~~5~~4. Use the same materials and aggregate gradation to be used on the project.

Table 3

ISSA TEST NO.	DESCRIPTION	SPECIFICATION
ISSA TB-139	Wet Cohesion @ 30 Minutes Minimum (Set) @ 60 Minutes Minimum (Traffic)	 12 kg-cm Minimum 20 kg-cm Minimum or Near Spin
ISSA TB-109	Excess Asphalt by LWT Sand Abrasion	50 g/ft^2 Maximum (538 g/m^2 Maximum)
ISSA TB-114	Wet Stripping	Pass (90% Minimum)
*ISSA TB-100	Wet-Track Abrasion Loss One-hour Soak Six-day Soak	 50 g/ft^2 (538 g/m^2) Maximum 75 g/ft^2 (807 g/m^2) Maximum
ISSA TB-147	Lateral Displacement Specific Gravity after 1,000 Cycles of 125 Pounds	5% Maximum 2.10 Maximum
ISSA TB-144	Classification Compatibility	11 Grade Points Minimum (AAA, BAA)
ISSA TB-113	Mix Time @ 77 degrees F	Controllable to 120 Seconds Minimum

* Perform the wet track abrasion test under laboratory conditions as a component of the mix design process.

~~B. To make changes in the job-mix gradation:~~
~~1. Submit a written request for a change in the job-mix gradation.~~
~~2. Submit a new job-mix design if any changes in gradation are outside the gradation band allowed by the stockpile tolerance in Table 2.~~

2.7 EQUIPMENT

A. Use mixing equipment specifically designed and manufactured to mix and place micro-surfacing.
1. Mix the material by an automatically sequenced, self-propelled micro-surfacing mixing machine, ~~which~~ that will be a continuous flow mixing

unit, able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, control setting additive, and water to a revolving multi-blade double shafted mixer and discharge the mixed product on a continuous flow basis.

2. Use a machine with sufficient storage capacity for aggregate, emulsified asphalt, mineral filler, control additive, and water to maintain an adequate supply to the proportioning controls.
3. Use a machine capable of self-loading materials while continuing to place micro-surfacing.
4. Equip the machine to allow the operator to have full control of the forward and reverse speed during applications of the micro-surfacing material.
   a) Use original equipment manufacturer design for ~~T~~the self-loading device, opposite side driver stations, and forward and reverse speed controls~~. will be original equipment manufacturer design.~~
5. Use proportioning devices with individual volume or weight controls for proportioning each material, (aggregate, mineral filler, emulsified asphalt, additive, and water), to be added to the mix.
   a) Use proportioning devices with controls properly marked~~, and which~~that ~~will~~ calibrate and determine the material output at any time.

B. Use spreading equipment that will agitate and spread the mixture uniformly by means of twin-shafted paddles or spiral augers fixed in the spreader box.
1. Provide a front seal ~~to insure~~that results in no loss of the mixture at the road contact point.
2. Provide an adjustable rear seal that ~~will~~ acts as final strike-off.
3. Use a spreader box with the rear strike-off designed and operated to produce a free flow of uniformly consistent materials to the rear strike-off.
4. Use a spreader box with a suitable means provided to side shift the box to compensate for variations in the pavement geometry.
5. Provide a secondary strike-off to improve surface texture, and with the same adjustments as the spreader box.
6. When filling ruts with an average depth greater than one-half inch, use a rut filling spreader box specifically designed to fill ruts.
   a) Apply micro-surface as a scratch-coat pass when required to fill ruts less than one-half inch, at the direction of the Engineer.
   b) For ruts of over one-half inch, make multiple passes with the rut filling spreader box, at the direction of the Engineer.
   c) Allow a twenty-four hour cure time after filling ruts before placing final micro-surfacing layer.

C. Calibrate each mixing unit in the presence of the Engineer as follows:
1. Prior to using on the project.
2. After repairs or as directed by the Engineer.

~~D. Provide calibration documentation of each mixing unit to include an individual calibration for each material at various settings, which can be related to the machines metering devices.~~

PART 3 EXECUTION

3.1 LIMITATIONS

~~3.1 LIMITATIONS~~

A. Do not apply micro-surface during rain, when road surface moisture is present, or during other adverse weather conditions.

B. Do not apply micro-surface if either the pavement or air temperature is below 50 degrees F.

C. Do not apply micro-surface when the temperature is projected below 33 degrees F within 24 hours of placing micro-surface.

D. Cease micro-surface operations when the weather or other conditions prolong opening road surface to traffic beyond two hours.

E. Keep traffic off roadway surface until the micro-surface has cured.

3.2 STOCKPILING

A. Construct individual 500 ton stockpiles of micro-surface aggregates.
1. Engineer approves stockpiles a minimum of one and a maximum of seven days prior to use.

B. Notify the Engineer a minimum of seven calendar days prior to micro-surface placement in order for the initial stockpiles to be sampled and tested for acceptance.

C. Obtain the Engineer's written acceptance of a stockpile prior to its use in micro-surface.

D. Remove material not meeting specifications from the stockpile area.

E. The Department will retest corrected material for acceptance.

3.3 PREPARATION

A Clean the surface of all dirt, sand, dust, oil, and other objectionable material immediately prior to applying micro-surface.

B. Allow un-sealed cracks to dry thoroughly prior to applying micro-surface when using water to clean the road surface.

C. Cover manholes, valve boxes, drop inlets and other service utility entrances prior to surfacing.

3.4 APPLICATION

A. Pre-wetting of the surface is allowed when required by local conditions by fogging ahead of the micro-surface box.
   1. Do not over apply, causing free water to sit on the pavement in front of the micro-surface box.

B. Place micro-surface mix that meets the job-mix design.
   1. Control the ingredients proportions by metering or measuring devices on the micro-surfacing equipment.
      a. Use readings from the metering or measuring devices to determine compliance with limits stated in the approved job-mix design.
   2. Limit ~~A~~any increase or decrease in the amount of mineral filler added to the mix during production ~~will be limited~~ to ±1 perent~~%~~ of the job-mix design
   3. The emulsion submitted with the job-mix design will serve as the standard to assure the same emulsion is used throughout the project.
      a. Should large enough disparities occur the Engineer may request a new job-mix design and re-approval of the micro-surfacing.

C. Pass the mineral aggregate over a scalping screen prior to transfer to the micro-surfacing mixing machine to remove oversize material.

D. Carry a sufficient amount of micro-surface in all parts of the spreader so that full width and complete coverage is obtained with no streaks or narrow spots.
   1. Avoid overloading the spreader.

E. Apply micro-surface of proper consistency at an average rate of 24 to 30 lb/yd^2.
   1. Apply micro-surface for rut filling as required.

F. Do not add additional water for any reason, once the mixture has been placed onto the road surface.

G. Remove and replace the micro-surface if any of the following occurs:
   1. Lumping, balling, or unmixed aggregates.
   2. Separation of the coarse aggregate from the emulsion and fines.
   3 Excessive breaking of emulsion inside the spreader box.
   4. Streaking caused by oversized aggregate.

5. Flushing or excessively rich areas appearing in the micro-surfacing after two hours from the time of placement.
6. Any measurable rutting, shoving or other evidence of premature deformation when exposed to traffic with re-approved micro-surfacing materials and procedures.

3.5 TEST STRIP

A. Apply a test strip of at least 500 f~~teet~~ in length on the roadway before initial placement commences.
   1. ~~The test strip must a~~Achieve initial set within 30 minutes and show no visual signs of distress when exposed to traffic action after curing for 2 hours.
   2. Become part of the completed item ~~I~~if the above conditions are present and all other requirements are met~~, the test strip will become part of the completed item~~.
   3. Remove and replace the micro-surfacing at no expense to the Department ~~I~~if the test strip fails to meet the conditions stated above~~, remove and replace the micro-surfacing at no expense to the department~~.

B. Make necessary adjustments if test strip does not pass.
   1. Obtain approval from the Engineer prior to repeating the test strip process.
   2. The Engineer may require a new job-mix design if failures indicate an ingredient problem.

3.6 FINISHING DETAILS

A. Place the micro-surface so the depth of each course does not exceed twice the maximum aggregate size.

B. Do not create build-up when constructing longitudinal and transverse joints.

C. Place micro-surface adjacent to concrete pavements or concrete curb and gutter with a straight longitudinal edge.
   1. Do not allow over-lap in these areas.

D. Maintain straight lines at all locations.

E. Place micro-surface at side streets and intersections out to right-of-way line.

F. Use hand squeegees to spread micro-surface in areas that cannot be reached with micro-surface machine.
   1. Lightly dampen areas prior to mix placement.
   2. Provide complete and uniform coverage.
   3. Avoid unsightly appearance from handwork.

4. Use the same type of finish in hand worked areas as applied by the spreader box.

G. Use construction paper or comparable products so all beginning and ending joint lines from each construction pass are straight.

END OF SECTION

Standards Committee Submittal Sheet

Name of preparer: John Butterfield/Tim Biel
Title/Position of preparer: Region Two Materials Engineer/Engineer for Materials
Specification/Drawing/Item Title: Asphalt Slurry Seal Coat
Specification/Drawing Number: 02789

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

Rewrite and submission of current special provision based on moving to a more appropriate gradation and changing some format regarding submittals and mix design procedures. Replaced Department Special Provision.

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

No change.

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below. Indicate if no comments were received.

Note: There is a two-week response time set for this item.

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)

See Below

ACEC Comments: (Use as much space as necessary.)

Responded with No comments

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)

Desna Bergold, Region Two

Construction Engineers

Karl Verhaeren

Contractors (Any additional contacts beyond "C" above.)

Has gone through 2 revisions through Utah Pavement Council, including representatives from Staker-Parsons, Geneva, Granite

Suppliers

Rusty Price, ISS – Part of original rewrite, has recently asked that we consider changing to continuous testing rather than stockpile acceptance. He is working on language to include but it was not ready at this date. Will make adjustments for Standards Committee if necessary.

Consultants (as required) (Any additional contacts beyond "C" above.)

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

Others (as appropriate)

RME Group approved

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)

   Changes are attached. May be further modified if we accept continuous testing.

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)

   No change

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

   Publishing the specification, notice will be given at Pavement Council.

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.

   If anything, price will go down due to reduced handling.

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).

   Currently no change. Continuous testing puts testing onus on the Contractor.

3. Life cycle cost.

   Should be increase due to elimination of marginal and inconsistent mix designs

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)

Less workload and better timing for Region Field personnel.

H. Safety Impacts?

None

I. History? Address issues relating to the current usage of the item and past reviews, approvals, and/or disapprovals.

Document has been a special provision for at least three years. Changes were requested, in part, by industry to improve the mix design process and bring more in line with national procedures.

Priority Explanation

Enter the appropriate priority in the box on the first page of the document.

Priority 1	Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.
Priority 2	Upon posting, this impacts projects being advertised.
Priority 3	Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

Supplemental Specification
2005 Standard Specification Book

SECTION 02789

ASPHALT SLURRY SEAL COAT

Add Section 02789:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products and procedures for mixing and spreading a properly proportioned mixture of fine graded aggregate, mineral filler, emulsified asphalt, and water.

B. Products and procedures for a cured slurry with a homogeneous appearance, a firm surface adhesion, and a skid resistant texture.

1.2 REFERENCES

~~B. Section 01452: Profilograph.~~

A. AASHTO M 17: Standard Specification for Mineral Filler for Bituminous Paving Mixtures

B. AASHTO M 29: Standard Specification for Fine Aggregate for Bituminous Paving Mixtures

C. AASHTO M 208: Standard Specification for Cationic Emulsified Asphalt

~~D. AASHTO T2: Sampling of Aggregates~~

DE. AASHTO T 11: Material Finer than 75 µm (No. 200) Sieve in Mineral Aggregate

E~~F~~D AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates

F~~G~~. AASHTO T 96: Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

~~H~~G. AASHTO T 104: Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate

H.~~I.~~ AASHTO T 176: Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test

I~~J~~. AASHTO T 278: Surface Frictional Properties Using the British Pendulum Tester

~~K~~J. AASHTO T 279: Accelerated Polishing of Aggregates Using the British Wheel

~~K~~L. ~~ASTM D 3910: Design, Testing, and Construction of Slurry Seal~~ (Note: Not found in text. Delete here or add in text. Renumber as required.)

L~~M~~. ISSA A105 Guidelines

M~~N~~. UDOT Minimum Sampling and Testing Requirements

1.3 ~~MINIMUM SAMPLING AND TESTING REQUIREMENTS~~~~CONTRACTOR~~ SUBMITTALS

~~A. Contractor Submittals~~

~~1~~A. Submit Mix Design and test results to the Engineer, 10 days prior to beginning construction.

1. Meet the requirements of this ~~s~~Section, article 2.7.

~~1~~2. Include target gradation for combined aggregate and mineral filler.

~~2~~B. Provide test reports for aggregate.

1. Meet the requirements of this ~~s~~Section, article 2.2.

~~. Aggregate~~

~~a. Certificate of Compliance material meets AASHTO M 29~~

~~b. Test Reports~~

~~1) Soundness (Na_2SO_4), AASHTO T 104~~

~~2) Sand Equivalent AASHTO T 176~~

~~3) LA Wear AASHTO T 96~~

~~C.~~ Provide a Manufacturer's Certificate of Compliance for Mineral Filler.~~3. Mineral Filler: Certificate of Compliance materials meets AASHTO M 17~~

~~4. Target gradation for combined aggregate and mineral filler.~~

~~5. Test results for Slurry Seal mix.~~

~~a. Slurry Seal consistency ISSA TB 106~~
~~b. Wet Cohesion: 30 minute and 60 minute, ISSA TB 139~~
~~c. Excess Asphalt by LWT Sand Abrasion, ISSA TB 109~~
~~d. Wet Stripping, ISSA TB 114~~
~~e. Wet-track abrasion loss, one-hour soak, ISSA TB 100~~
~~f. Mix Time, ISSA TB 113~~

~~6~~D. ~~E~~Provide verification that the emulsified asphalt supplier adheres to UDOT Minimum Sampling and Testing Requirements Section 508 Asphalt Emulsion Quality Management Plan.

~~mulsified Asphalt~~

a. Provide a ~~C~~certificate of analysis/compliance from the manufacturer for each shipment.

~~7. Resident Engineer approved submittals.~~

~~B. Quality Assurance for aggregate stockpiles, performed by the Department~~
~~1. Aggregate stockpile sieve analysis, AASHTO T 2, T 27 / T 11~~
~~a. Stockpiles are approved a minimum of one and maximum of seven days prior to use.~~
~~b. One gradation per 500 tons of material (estimated) in stockpile.~~
~~c. Out of specification material will be rejected.~~

~~C. Documentation/Report~~
~~1. Verification emulsified asphalt supplier adheres to *UDOT Minimum Sampling and Testing Requirements* Section 508 Asphalt Emulsion Quality Management Plan from the UDOT website. Refer to http://www.udot.utah.gov/index.php/m=c/tid=719 for dated, signed, qualified list printout.~~

~~**Table 1**~~

~~**Gradation Upper and Lower Limit Determination**~~

~~Parameter~~	~~UL and LL~~
~~1/2" sieve for ¾ inch BWC (Type C)~~ ~~3/8" sieve for ½ inch BWC (Type B)~~	~~Target Value ± 6.0 percent~~
~~# 4 sieve~~	~~Target Value ± 6.0 percent~~
~~# 8 sieve~~	~~Target Value ± 5.0 percent~~
~~#50 sieve~~	~~Target Value ± 3.0 percent~~
~~# 200 sieve~~	~~Target Value ± 2.0 percent~~
~~Asphalt Binder Content~~	~~Target Value ± 0.35 percent~~

Table 1	
Gradation Upper and Lower Limit Determination	
Parameter	UL and LL
1/2" sieve for ¾ inch BWC (Type C) 3/8" sieve for ½ inch BWC (Type B)	Target Value ± 6.0 percent
# 4 sieve	Target Value ± 6.0 percent
# 8 sieve	Target Value ± 5.0 percent
#50 sieve	Target Value ± 3.0 percent
# 200 sieve	Target Value ± 2.0 percent
Asphalt Binder Content	Target Value ± 0.35 percent

PART 2 PRODUCTS

2.1 EMULSIFIED ASPHALT

A. Use a cationic emulsified asphalt grade CQS-1H as specified in AASHTO M 208.

B. Use a polymer modified emulsion CQS-1HP, meeting CQS-1H specifications identified in AASHTO M 208 and ISSA A 105, using solid synthetic rubber or latex material.

1. Combine the polymer modifier with the base asphalt or asphalt emulsion at a minimum rate of 3 percent% solids by weight of asphalt, prior to loading at the manufacturing plant.
2. Use a polymer modified emulsion compatible with the mix design developed for the conventional slurry seal.

C. Provide a certificate of analysis/compliance from the manufacturer for each shipment of emulsified asphalt to the Engineer.

DC. Verify that the shipment is the same as the mix design.

ED. Adhere to UDOT Minimum Sampling and Testing Requirements Section 508 Asphalt Emulsion Quality Management Plan.

2.2 AGGREGATE

A. Use 100 percent manufactured sand, slag, crushed fines, or a combination as specified in AASHTO M 29.

B. Use aggregate that is clean and free from organic matter or other detrimental substances~~5~~.

C. Use an aggregate blend with a sand equivalent of forty five or more. AASHTO T 176.

D. Meet a minimum polishing value of 31. AASHTO T 278, AASHTO T 279.

E. Use aggregate with 35 percent or less loss by abrasion. AASHTO T 96.

F. Meet 15 percent soundness maximum using $Na_2 SO_4$. AASHTO T 104.~~5~~

2.3 MINERAL FILLER

A. Use Portland cement, hydrated lime, or aluminum sulfate as specified in AASHTO M 17.

2.4 COMBINED AGGREGATE AND MINERAL FILLER

A. Use a job mix or target gradation within the gradation band. Base the mix design on this gradation. After the target gradation has been submitted the percent passing each sieve will not vary by more than the stockpile tolerance and still remain within the gradation band. AASHTO T 11, AASHTO T 27. Refer to Table 1.

Table 1

Gradation		
Sieve Size	**Gradation Band (% Passing)**	**Stockpile Tolerance**
3/8 inch	100	
No. 4	70-90	+/- 5%
No. 8	45-70	+/- 5%
No. 16	28-50	+/- 5%
No. 30	19-34	+/- 5%
No. 50	12-28	+/- 4%
No. 100	7-18	+/- 3%
No. 200	5-15	+/- 2%

2.5 WATER

A. Potable and free from harmful salts and contaminants.

2.6 ADDITIVES

A. Use additives as required to accelerate or retard the break-set of the slurry seal or to improve the resulting finished surface.
   1. Determine the initial additive quantities by the mix design for the slurry mix or individual materials.
   2. Obtain Engineer approval.

2.7 SLURRY SEAL MIX DESIGN

A. Provide the Engineer with the test results and the proposed mix design from a~~n~~ UDOT approved laboratory conforming to the following tests in ISSA A105.
   1. Use the same materials and aggregate gradation to be used on the project. ~~, 10 days prior to beginning construction:~~

ISSA TEST NO.	DESCRIPTION	SPECIFICATION
ISSA TB 106	Slurry Seal Consistency	2cm Minimum; 3cm Max.
ISSA TB-139 (For quick-traffic systems)	Wet Cohesion 30 Minutes Minimum (Set) Wet Cohesion 60 Minutes Minimum	12 kg-cm Minimum 20 kg-cm Minimum
ISSA TB 109 (For heavy-traffic areas only)	Excess Asphalt by LWT Sand Abrasion	50 g/ft^2 Maximum (538 g/m^2 Maximum)
ISSA TB-114	Wet Stripping	Pass (90% Minimum)
ISSA TB-100	Wet-Track Abrasion Loss, One-hour Soak	75 g/ft^2 (807 g/m^2)
ISSA TB-113	Mix Time**	Controllable to 180 Seconds Minimum

** Perform the mixing test and set-time test at the highest temperatures expected during construction.

~~B. Submit the mix design to Engineer using the same materials and aggregate gradation to be used on the project.~~

2.8 EQUIPMENT

A. Use only a machine designed and manufactured specifically for blending, mixing, and placing slurry seal.
   1. Mix the material in a self-propelled, slurry seal mixing machine of either truck-mounted or continuous-run design.
      a) Continuous-run machines: equipped to self-load materials while continuing to lay slurry seal.
      b) Either type machine: accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, control setting additive, and water to a revolving mixer and to discharge the mixed product on a continuous-flow basis.
   2. Maintain sufficient storage capacity within the machine for aggregate, emulsified asphalt, mineral filler, control additive and water to maintain an adequate supply to the proportioning controls.

B. Calibrate each mixing unit in the presence of the Engineer before a machine is used on a project

PART 3 EXECUTION

3.1 LIMITATIONS

A. Do not apply slurry seal during rain, when road surface moisture is present, or during other adverse weather conditions.

B. Do not apply slurry seal if either the pavement or air temperature is below 50 degreed F and falling. Slurry seal may be applied when both the pavement and air temperatures are above 45 degrees F and rising.

C. Do not apply slurry seal when the temperature is projected below 33 degrees F within 24 hours of placing slurry seal.

D. Cease slurry seal operations when weather or other conditions prolong opening road surface to traffic beyond two hours.

E. Keep traffic off roadway surface until the slurry seal has cured.

3.2 STOCKPILING

A. Construct individual 500 ton stockpiles of slurry seal aggregates.
   1. Engineer approves stockpiles a minimum of one and a maximum of seven days prior to use.

B. Notify the Engineer a minimum of seven calendar days prior to slurry seal placement in order for the initial stockpiles to be sampled and tested for acceptance.

C. Obtain the Engineer's written acceptance of all stockpiles prior to use in slurry seal.

D. Remove material not meeting specifications from the stockpile area.

E. The Department will retest corrected material for acceptance.

3.3 PREPARATION

A. Clean the surface of all dirt, sand, dust, oil, and other objectionable material immediately prior to applying the slurry.

B. Allow cracks to dry thoroughly before applying slurry seal when using water to clean the surface.

C. Protect manholes, valve boxes, drop inlets and other service utility entrances prior to surfacing.

3.4 APPLICATION

A. Pre-wet the entire surface by fogging ahead of the slurry box. Do not over apply, causing free water to sit on the pavement in front of the slurry box.

B. Carry a sufficient amount of slurry in all parts of the spreader at all times so that full width and complete coverage is obtained with no streaks or narrow spots. Avoid overloading the spreader.

C. Apply slurry mixture of proper consistency at an average rate of 18 to 22 lb/yd^2.

D. Do not add additional water for any reason, once the mixture has been placed onto the road surface.

E. Remove and replace the slurry if any of the following occurs:
   1. Lumping, balling, or unmixed aggregates.
   2. Separation of the coarse aggregate from the emulsion and fines.
   3. Settling of the coarse aggregate to the bottom of the mix.
   4. Excessive breaking of emulsion inside the spreader box.
   5. Streaking caused by oversized aggregate.

3.5 FINISHING DETAILS

A. Do not create build-up when constructing longitudinal and transverse joints.

B. Place slurry seal adjacent to concrete pavements or concrete curb and gutter with a straight longitudinal edge. Do not allow over-lap on these areas.

C. Maintain straight lines at all locations.

D. Place slurry seal at side streets and intersections out to right-of-way line.

E. Use hand squeegees to spread slurry in areas that cannot be reached with slurry seal machine.
   1. Lightly dampen areas prior to mix placement.
   2. Provide complete and uniform coverage.
   3. Avoid unsightly appearance from hand work.
   4. Use the same type of finish in hand worked areas as applied by the spreader box.

F. Use construction paper or comparable products so all beginning and ending joint lines from each construction pass are straight.

END OF SECTION

Standards Committee Submittal Sheet

Name of preparer: John Butterfield/Tim Biel
Title/Position of preparer: Region Two Materials Engineer/Engineer for Materials
Specification/Drawing/Item Title: Open-Graded Surface Course
Specification/Drawing Number: 02786

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

Rewrite based on changing some format regarding submittals and addressing significant sampling and testing procedures and incentives/disincentives.

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

No change.

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below. Indicate if no comments were received.

Note: There is a two-week response time set for this item.

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)

See Below

ACEC Comments: (Use as much space as necessary.)

Responded with No comments

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)

Desna Bergold, Region Two

Construction Engineers

Karl Verhaeren

Contractors (Any additional contacts beyond “C” above.)

Has gone through Utah Pavement Council, including representatives from Staker-Parsons, Geneva, Granite

Suppliers

Has gone through Utah Pavement Council, including representatives from Staker-Parsons, Geneva, Granite

Consultants (as required) (Any additional contacts beyond “C” above.)

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

Others (as appropriate)

RME Group approved

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)

   No Change

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)

   No change

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

   Publishing the specification, notice will be given at Pavement Council.

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.

   Should be somewhat the same. Both the incentives and disincentives have been increased due to increases in product cost. Average cost will depend on quality of supplier and ability to produce material without penalty.

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).

   Will need to update the penalty and reject procedures to match the new values.

3. Life cycle cost.

   Minimal decrease with better control and a little reduced risk on the contractor's side.

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)

More consistent flow and application. Not penalizing good material.

H. Safety Impacts?

None

I. History? Address issues relating to the current usage of the item and past reviews, approvals, and/or disapprovals.

None

Priority Explanation

Enter the appropriate priority in the box on the first page of the document.

Priority 1 Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.

Priority 2 Upon posting, this impacts projects being advertised.

Priority 3 Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

Supplemental Specification
2005 Standard Specification Book

SECTION 02786

OPEN-GRADED SURFACE COURSE (OGSC)

Delete Section 02786 and replace with the following:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and procedures for constructing OGSC.

1.2 RELATED SECTIONS

A. Section 01452: ~~Profilograph and~~ Pavement Smoothness

B. ~~Section 02741: Hot Mix Asphalt (HMA)~~ (Note: Deleted in text, not added elsewhere)

~~C~~B. Section 02745: Asphalt Material

~~D~~C. Section 02746: Hydrated Lime

~~E~~D. Section 02748: Prime Coat/Tack Coat

1.3 REFERENCES

~~A. AASHTO T 11: Materials Finer Than 75 µm (No. 200) Sieve in Mineral Aggregates by Washing~~

~~B. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates~~

~~C~~A. AASHTO T 30: Mechanical Analysis of Extracted Aggregate

~~D~~B. AASHTO T 89: Determining the Liquid Limit of Soils

C~~E~~. AASHTO T 90: Determining the Plastic Limit and Plasticity Index of Soils

DF. AASHTO T 96: Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine

EG. AASHTO T 104: Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate

FH. AASHTO T 112: Clay Lumps and Friable Particle in Aggregate

IG.. AASHTO T 176: Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test

HJ. AASHTO T 278: Surface Frictional Properties Using the British Pendulum Tester

IK. AASHTO T 279: Accelerated Polishing of Aggregates Using the British Wheel

LJ. AASHTO T 304: Uncompacted Void Content of Fine Aggregate

MK. AASHTO T 308: Determining the Asphalt Binder Content of Hot-Mix Asphalt (HMA) by the Ignition Method

N. ASTM D 979: Sampling Bituminous Paving Mixtures

L. AASHTO TP 61: Determining the Percentage of Fractured Particles in Coarse Aggregate

O. ASTM D 3042: Standard Test for Insoluble Residue in Carbonate Aggregate

P. ASTM D 3665: Random Sampling of Construction Materials

Q. ASTM D 4791: Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

R. ASTM D 5821: Determining the Percentage of Fractured Particles in Coarse Aggregate

S. UDOT Quality Management PlanM. UDOT Quality Management Plan (Note: Can't remove. Still in 2.1 B.)

MNT. UDOT Materials Manual of Instruction

NOU. UDOT Minimum Sample and Testing GuideRequirements

1.4 SUBMITTALS

A. Job mix gradation: at least 10 working days before paving.

1. Submit materials and documentation in accordance with Materials Manual of Instruction, Section 954.
2. Aggregate suitability test results.

B. Changes in job mix gradation:
1. Submit a written request for a change in a job-mix gradation.
2. Give the Engineer ~~5~~five working days to review and approve the changes and to readjust the quantity of asphalt binder to be used.

C. Verification that Hydrated Lime meets 02746

D. Verification Asphalt Binder meets 02745

1.~~5~~4 ACCEPTANCE

A. Acceptance sampling and testing of material is in accordance with UDOT Minimum Sampling and Testing Requirements.

~~A~~B.~~.~~ A lot equals the number of tons placed during each production day.
~~When daily production rates are anticipated at less than 900 tons per production day, lots may be increased to equal the number of tons placed during up to three production days as agreed upon in advance by both the Contractor and the Engineer.~~

~~BC. Submit an engineering analysis within one week, if requesting a rejected lot remain in place.~~
~~1. Include in the analysis: Data and engineering principles that indicate why the pavement should remain in place.~~
~~2. The Engineer, Region Materials Engineer, and Region Construction~~District ~~Engineer review the analysis for acceptance, denial, or revision within three working days.~~
~~3. If the request is denied, remove the rejected material from the project within 72 hours and replace it with an acceptable material.~~
~~4. If rotomilling is required, agree on removal time period.~~
~~5. Department deducts $15.00 per ton if a rejected lot is allowed to remain in place.~~

~~C~~D1. A lot is evaluated on the test results of four samples, with the following exceptions:~~Binder Content and Gradation~~
~~1. Engineer takes four random samples per lot at the plant according to UDOT Materials Manual of Instruction Part 8 – 894. ASTM D 979, ASTM D 3665.~~
~~2~~a. If only three samples can be taken ~~on~~ for the production day ~~for reasons beyond the Contractor's control~~; compute

incentive/disincentive ~~from~~ using the test results from~~the~~ three ~~random~~ samples ~~rather than four~~.

~~b~~3. Add the lot to the next day's production if ~~four~~ three random samples cannot be taken. ~~Evaluate pay adjustment with the appropriate sample size.~~

~~c~~4. Add the lot to the previous day's production for the last day's production if ~~four~~ three random samples cannot be taken. ~~Evaluate with the appropriate sample size.~~

d. When less than 900 tons are anticipated per production day, the lot may be increased to include up to three production days, when agreed upon in advance by both the Contractor and the Engineer.

e. Evaluate with the appropriate number of tests "n" in Table 4:

~~5. Obtain the binder content from the ignition oven test. AASHTO T 308.~~

~~6~~2. Asphalt Binder: Department will c~~C~~ompute ~~Incentive~~Pay Adjustment ~~/Disincentive~~ for asphalt binder content ~~per lot~~ based on Table 1 using the single test result with the largest deviation from the target. AASHTO T 308.

a. Apply incentive to the entire lot.

b. D~~Any d~~isincentive is applied only to the sublot (defined as~~based on~~ percentage of the lot represented by the test).

c. Any lot that includes one or more ~~with any~~ sublots in disincentive is not eligible for incentive ~~for asphalt binder content on any other sublot.~~

3. Gradation: Department will compute Incentive/Disincentive for gradation is based on Percent Within Limits computation using Table 2, 3, 4, and 5. AASHTO T 30

a. The Department will reject the lot if the Percent Within Limits is less than 60 percent.

4. Any lot rejected based on either gradation or asphalt binder content will not be eligible for any incentive.

E. Thickness

1. Verify the thickness with a depth probe and take corrective action if necessary.

a. Minimum thickness: Plan depth minus ~~1~~ ¼ inch.

F. Smoothness

1. Determine acceptance and correct in accordance with Section 01452.

G. Submit an engineering analysis within one week, if requesting that a rejected lot or sublot remain in place.

1. Include in the analysis: Data and engineering principles that indicate why the pavement should remain in place.

2. The Engineer, Region Materials Engineer, and District Engineer review the analysis for acceptance, denial, or revision within three working days.
3. If the request is denied, remove the rejected material from the project within 72 hours and replace it with an acceptable material.
4. If rotomilling is required, agree on removal time period.
5. Department deducts ~~$2015.00 per ton~~$20/ton if a rejected lot or sublot is allowed to remain in place.

Table 1

~~Table 1~~**Binder Pay Adjustment**	
Binder Content	**Pay Adjustment in $/ton OGSC**
Within ± 0.30% of target	+1.00
Between ± 0.31% and ± 0.45% of target	0.00
Between ± 0.46% ± 0.60% of target	-2.00
Greater than ± 0.61%	Reject

~~7. Engineer conducts aggregate gradations tests per lot on the residue of the ignition oven test. AASHTO T 30.~~
~~8. Incentive/Disincentive for gradation is based on Percent Within Limits computation using Table 2, 3, 4, and 5.~~
~~9. The Department will reject the lot if the Percent Within Limits is less than 60 percent.~~

Table 2

~~Table 2~~	
Gradation Upper and Lower Limit Determination	
Parameter	UL and LL
3/8 inch~~"~~ sieve	Target Value ± 6.0 percent
# 4 sieve	Target Value ± 6.0 percent
# 8 sieve	Target Value ± 5.0 percent
# 200 sieve	Target Value ± 2.0 percent

Table 3

~~Table 3~~ **Incentive/Disincentive for Gradation**	
Gradation	
PT ~~**Based on Min. Four Samples**~~	**Incentive/Disincentive** **(Dollars/Ton)**
> 99	0.9183
96-99	0.7467
92-95	0.4137
88-91	0.076
84-87	-0.264
80-83	-0.6054
76-79	-0.9384
72-75	-1.2715
68-71	-1.6045
64-67	-1.9375
60-63	-2.2706
<60	Reject

Table 4

~~Table 4~~ Quality Index Values for Estimating Percent Within Limits										
PU/PL	**n=3**	**n=4**	**n=5**	**n=6**	**n=7**	**n=8**	**n=10**	**n=12**	**n=15**	**n=20**
100	1.16	1.50	1.75	1.91	2.06	2.15	2.29	2.35	2.47	2.56
99	1.16	1.47	1.68	1.79	1.89	1.95	2.04	2.09	2.14	2.19
98	1.15	1.44	1.61	1.70	1.77	1.80	1.86	1.89	1.93	1.97
97	1.15	1.41	1.55	1.62	1.67	1.69	1.74	1.77	1.80	1.82
96	1.15	1.38	1.49	1.55	1.59	1.61	1.64	1.66	1.69	1.70
95	1.14	1.35	1.45	1.49	1.52	1.54	1.56	1.57	1.59	1.61
94	1.13	1.32	1.40	1.44	1.46	1.47	1.49	1.50	1.51	1.53
93	1.12	1.29	1.36	1.38	1.40	1.41	1.43	1.43	1.44	1.46
92	1.11	1.26	1.31	1.33	1.35	1.36	1.37	1.37	1.38	1.39
91	1.10	1.23	1.27	1.29	1.30	1.31	1.32	1.32	1.32	1.33
90	1.09	1.20	1.23	1.24	1.25	1.25	1.26	1.26	1.27	1.27
89	1.08	1.17	1.20	1.21	1.21	1.21	1.21	1.21	1.22	1.22
88	1.07	1.14	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17
87	1.06	1.11	1.12.	1.12	1.12	1.13	1.13	1.13	1.13	1.13
86	1.05	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
85	1.03	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04	1.04
84	1.02	1.02	1.02	1.01	1.01	1.01	1.00	1.00	1.00	1.00
83	1.00	0.99	0.98	0.97	0.97	0.96	0.96	0.96	0.96	0.96
82	0.98	0.96	0.95	0.94	0.94	0.93	0.93	0.92	0.92	0.92
81	0.96	0.93	0.92	0.91	0.90	0.90	0.89	0.89	0.89	0.88
80	0.94	0.90	0.88	0.87	0.86	0.86	0.85	0.85	0.85	0.85
79	0.92	0.87	0.85	0.84	0.83	0.83	0.82	0.82	0.82	0.81
78	0.89	0.84	0.82	0.81	0.80	0.79	0.79	0.78	0.78	0.78
77	0.87	0.81	0.79	.0.78	0.77	0.76	0.76	0.75	0.75	0.75
76	0.84	0.78	0.76	0.75	0.74	0.73	0.72	0.72	0.72	0.72
75	0.82	0.75	0.73	0.72	0.71	0.70	0.69	0.69	0.69	0.68
74	0.79	0.72	0.70	0.68	0.67	0.67	0.66	0.66	0.66	0.65
73	0.77	0.69	0.67	0.65	0.64	0.64	0.62	0.62	0.62	0.62
72	0.74	0.66	0.64	0.62	0.61	0.61	0.60	0.59	0.59	0.59
71	0.71	0.63	0.60	0.59	0.58	0.58	0.57	0.56	0.56	0.56
70	0.68	0.60	0.58	0.56	0.55	0.55	0.54	0.54	0.54	0.53
69	0.65	0.57	0.55	0.54	0.53	0.52	0.51	0.51	0.51	0.50
68	0.62	0.54	0.52	0.51	0.50	0.50	0.48	0.48	0.48	0.48
67	0.59	0.51	0.49	0.48	0.47	0.47	0.46	0.45	0.45	0.45
66	0.56	0.48	0.46	0.45	0.44	0.44	0.43	0.42	0.42	0.42
65	0.53	0.45	0.43	0.42	0.41	0.41	0.40	0.40	0.40	0.39
64	0.49	0.42	0.40	0.39	0.38	0.38	0.37	0.37	0.37	0.37
63	0.46	0.39	0.37	0.36	0.35	0.35	0.35	0.34	0.34	0.34
62	0.43	0.36	0.34	0.33	0.33	0.33	0.32	0.31	0.31	0.31
61	0.39	0.33	0.31	0.30	0.30	0.30	0.29	0.29	0.29	0.28
60	0.36	0.30	0.28	0.27	0.26	0.26	0.25	0.25	0.25	0.25
<60	≤ 0.35	≤ 0.29	≤ 0.27	≤ 0.26	≤ 0.25	≤ 0.25	≤ 0.24	≤ 0.24	≤ 0.24	≤ 0.24

Enter table in the appropriate "number of tests"~~sample size~~ column and round down to the nearest value.

Table 5

~~Table 5~~ Definitions, Abbreviations, and Formulas for Acceptance	
Term	**Explanation**
Target Value (TV)	The target values for gradation and~~,~~ asphalt binder content ~~and VMA are given in the Contractor's volumetric mix design~~. ~~See article 1.4, line E, for density target values.~~
Average (AVE)	The sum of the lot's test results for a measured characteristic divided by the number of test results; the arithmetic mean.
Sample Standard Deviation (s)	The square root of the value formed by summing the squared difference between the individual test results of a measured characteristic and AVE, divided by the number of test results minus one. ~~This statement does not limit the methods of calculations of s; other methods that obtain the same value may be used.~~
Upper Limit (UL)	The value above the TV of each measured characteristic that defines the upper limit of acceptable production. (Table 2~~3~~)
Lower Limit (LL)	The value below the TV of each measured characteristic that defines the lower limit of acceptable production (Table 2~~3~~)
Upper Quality Index (QU)	QU = (UL - AVE)/s
Lower Quality Index (QL)	QL = (AVE - LL)/s
Percentage of Lot Within UL (PU)	Determined by entering Table 4 with QU.
Percentage of Lot Within LL (PL)	Determined by entering Table 4 with QL.
Total Percentage of Lot (PL) Within UL and LL (PT)	PT = (PU + PL) - 100
Incentive/Disincentive	Determined by entering Table 3~~1 and 2~~ with PT or PL.

All values for AVE, s, QU, and QL will be calculated to at least a~~to~~ two decimal place accuracy which will be carried through all further calculations. Rounding to lower accuracy is not allowed.

~~10. Any lot rejected based on either gradation or binder content will not be eligible for any incentive.~~

~~DE. Thickness~~

~~1. Verify the thickness with a depth probe and take corrective action if necessary.~~

~~a. Minimum thickness: Plan depth minus 1/4 inch.~~

~~EF. Smoothness~~

~~1.Determine acceptance and correct in accordance with Section 01452.~~

PART 2 PRODUCTS

2.1 ASPHALT MATERIAL

A. As specified, and following Section 02745.

B. Sampling procedure: UDOT Quality Management Plan - 509 Asphalt Binder.

2.2 HYDRATED LIME

A. Meet the requirements of Section 02746.

2.3 AGGREGATE MATERIALS

~~A. Refer to the UDOT Minimum Sample and Testing Requirements, Section 1, Tabulation of Acceptance Sampling and Testing.~~

~~B~~A. Crusher processed virgin aggregate material consisting of crushed stone, gravel, or slag.

~~C~~B. Meet the following requirements, including Table 6~~3~~, to determine the acceptability of the aggregate.

1. Coarse aggregate:
   a. Retained on # 4 sieve.
2. Fine aggregate:
   a. Clean, hard grained, and angular.
   b. Passing the # 4 sieve.

Table 6

~~**Table 6**~~

Aggregate Properties		
Properties	**Test Method**	**Test Requirement**
One Fractured Face	~~ASTM D 5821~~AASHTO TP 61	95 percent min.
Two Fractured Face	~~ASTM D 5821~~AASHTO TP 61	90 percent min.
Fine Aggregate Angularity	AASHTO T 304	45 min.
~~Flat and Elongated (1 to 3 ratio)~~Flakiness Index	~~ASTM D 4791 (Based on 3/8 inch and above)~~UDOT MOI 933	2~~1~~0 % max.

L.A. Wear	AASHTO T 96	30 % max.
Sand Equivalent	AASHTO T 176	60 min.
Plasticity Index	AASHTO T 89 and T 90	0
Polish Test	AASHTO T 278 & T 279	31 min.
Soundness (sodium sulfate)	AASHTO T 104	12 % max. loss with five cycles
Clay Lumps and Friable Particles	AASHTO T 112	2 % max.
~~Standard Test Method for Insoluble Residue in Carbonate Aggregates~~	~~ASTM D 3042~~	~~30 % max.~~
Natural Fines	None	None

~~D. Meet the following gradation:~~

~~Table 7~~	
~~Aggregate Gradation (Percent Passing by Dry Weight of Aggregate - AASHTO T11, T27)~~	
~~Sieve Size~~	~~Percent~~
~~½ inch~~ ~~3/8 inch~~ ~~# 4~~ ~~# 8~~ ~~# 200~~	~~100~~ ~~90 - 100~~ ~~35 - 45~~ ~~14 - 20~~ ~~2 - 4~~

2.4 JOB-MIX

A. Obtain approval for job mix gradation:

~~1. Submit at least 10 working days before paving.~~

~~2~~1. Show definite single values for the percentage of aggregate passing each sieve based on the dry weight of aggregate.

2~~3~~. Stay within the single value gradation limits of Table 7~~4~~.

~~3~~4. Incorporate minimum hydrated lime by dry weight of aggregate into all mixtures. ~~Add Hydrated Lime~~Refer to Section 02746:

~~a.~~ Method A, Lime Slurry incorporate 1 percent~~;~~

b. ~~or~~ Method B, Lime Slurry Marination~~.~~ incorporate 1- ~~1/2~~½ percent

~~b. Refer to Section 02746.~~

~~c. Incorporate minimum hydrated lime by dry weight of aggregate into all mixtures. (1 percent for Method A; 1- 1/2 percent for Method B).~~

B. Binder Content

1. The Engineer determines the binder content. MOI Section 954.

~~and supplies samples to determine the correction factor.~~

Table 7

~~Table 7~~ Aggregate Gradation	
~~Aggregate Gradation~~ (Percent Passing by Dry Weight of Aggregate)	
Sieve Size	**Percent**
½ inch	100
3/8 inch	90 - 100
# 4	35 - 45
# 8	14 - 20
# 200	2 - 4

~~C. Changes in job mix gradation:~~

~~1. Submit a written request for a change in a job mix gradation.~~

~~2. Give the Engineer 5 working days to review and approve the changes and to readjust the quantity of asphalt binder to be used.~~

PART 3 EXECUTION

3.1 MIXING

A. ~~Mix as specified in Section 02741.~~Mix OGSC until ~~The mineral aggregate coating will be considered satisfactory when a~~all particles are coated.

B. Treat aggregate with hydrated lime in accordance with the requirements of 02746.

~~1.~~ When using ~~Method A~~ Method A, ~~insure~~verify lime slurry equipment is operating at all times.

a. Cease production if hydrated lime slurry ~~operation~~treatment is interrupted.

b. Engineer may require marination of the aggregate/hydrated lime mixture in the stockpile, Method B, if ~~OGSC~~ production continues without hydrated lime slurry treatment.

3.2 SURFACE PLACEMENT

A. Apply the tack coat at a uniform rate ~~of 0.10 gal/yd^2 undiluted emulsion or 0.15 gal/yd^2 2:1 diluted emulsion~~. ~~Note: 2:1 diluted emulsion represents 2 parts undiluted emulsion and 1 part water.~~ Refer to Section 02748.
   1. 0.10 gal/yd^2 on new pavement
   2. 0.15 gal/yd^2 on milled surfaces

B. Maintain a steady paver speed

C. Roll sufficiently to seat without fracturing aggregate.

D. Bring all passes up even transversely at the end of each working day.

E. Construct longitudinal joints within 6 inches of lane lines.

F. Remove slick spots as directed by the Engineer.

3.3 LIMITATIONS

A. Place OGSC between May 1~~,~~ and September 15.
   1. Obtain written approval from the Engineer before placing OGSC after September 15.

B. ~~, and only~~Place OGSC when ~~both~~ the air temperature in the shade and the pavement surface temperature are above 60 degrees F and rising.

~~B. Obtain written approval from the Engineer before placing OGSC after September 15.~~

C. Do not place OGSC if surface moisture is present.~~Do not place when it is determined by the Engineer that excessive moisture may be present in the pavement structure.~~

D. Do not place during rain~~, when the surface is wet,~~ or during other adverse weather conditions.

END OF SECTION

Standards Committee Submittal Sheet

Name of preparer: Barry Axelrod and Robert Miles
Title/Position of preparer:
Specification/Drawing/Item Title: N/A
Specification/Drawing Number: N/A

Enter appropriate priority level:
(See last page for explanation) **3**

Sheet not required on editorial or minor changes to standards. Check with Standards Section.

NOTES:
1. All Submittal Sheets must be completed and sent to the Standards and Specifications Section by the Standards Committee suspense date as shown on the Web. (http://www.udot.utah.gov/index.php/m=c/tid=303)
2. The Preparer of the Submittal Sheet or the Standards Committee member (or authorized substitute) responsible for the submittal must be present at the Standards Committee meeting and capable of discussing and answering all questions related to the submittal. The item will be postponed to a later meeting if one of these people is not present.
3. Notify the Standards and Specifications Section immediately of any changes that impact the presentation to include absence of sponsor or delay in presentation.

Complete the following: (Use additional pages as needed.)

A. Why? Detail the reason for changing the Standard (Specification or Drawing), what has initiated a new Standard, or what has caused a new or changed item of interest.

Several specification changes have been reviewed and approved that are more than editorial in nature but not substantial enough for full Standards Committee approval. This method was approved by the Standards Committee during the April 2007 meeting to alleviate a possible backlog of changes in preparation for the 2008 Standards issue.

B. How is Measurement and Payment handled? Existing (from the measurement and payment document), modified, or new measurement and payment to be included with all Standard Specifications or Supplemental Specifications.

None expected at this time, but could be possible. This still fits within the scope of this sub-group.

C. Stakeholder Notification for AGC and ACEC:

By email provide the AGC and ACEC Standards Committee member a copy of all pertinent information relating to the specification or drawing. Detail all responses below. Indicate if no comments were received.

Note: There is a two-week response time set for this item.

Refer to the Standards Committee Web site, Members page at http://www.udot.utah.gov/index.php/m=c/tid=659 for the respective e-mail addresses.

AGC Comments: (Use as much space as necessary.)

N/A

ACEC Comments: (Use as much space as necessary.)

N/A

D. Stakeholders? From the list provided, document the stakeholders contacted, detailing: the company, name of contact, how contacted (by phone, email, hard copy, or in person), concerns, and comments of the change. Stakeholders:

Note: There is a two-week response time set for this item. Allow Stakeholders two weeks to process and respond to coordination requests. All areas should try to complete review and comment as soon as possible but within two weeks.

In-house (for example, preconstruction, materials, construction, safety, design, maintenance) (Include all applicable in-house areas even if not listed above.)

Sub-group consists of Robert Miles, Barry Axelrod, John Butterfield, and an FHWA representative. Others attend as appropriate to present their material.

Construction Engineers

N/A

Contractors (Any additional contacts beyond “C” above.)

N/A

Suppliers

N/A

Consultants (as required) (Any additional contacts beyond “C” above.)

N/A

FHWA (To be accomplished as part of the two-week process before submitting to the Standards and Specifications Section for inclusion on the Standards Committee agenda.) (This is in addition to the requirements of UDOT Policy 08A5-1, procedure 08A5-1.3.)

N/A

Others (as appropriate)

As needed.

E. Other impacted areas, systems, or personnel. (Consider all impacts and possible changes to these areas during the preparation process. Coordinate with all appropriate areas for the respective item. List all impacts and action taken.)

1. Minimum Sampling and Testing Guide (MS&T Guide)

   N/A

2. Business Systems (Electronic Bid System, Project Development Business System, Electronic Program Management, Computer-Aided Drafting and Design, etc.)

   N/A

3. Implementation Plan (Provide detailed instructions on how the subject item will be implemented to include notification of all interested parties and training requirements.)

   Standard publishing procedures.

F. Costs? (Estimates are acceptable.)

1. Additional costs to average bid item price.

   Unknown. May be applicable on a case-by-case basis.

2. Operational (For example, maintenance, materials, equipment, labor, administrative, programming).

   Unknown. May be applicable on a case-by-case basis.

3. Life cycle cost.

   Unknown. May be applicable on a case-by-case basis.

G. Benefits? (Provide details that can be used to complete a Cost – Benefit Analysis.) (Estimates are acceptable.) (If no costs, what is the benefit of making this change?)

Improve wording and flow of specifications. Better standardization of actions.

H. Safety Impacts?

None anticipated.

I. History? Address issues relating to the current usage of the item and past reviews, approvals, or disapprovals.

None

Priority Explanation

Enter the appropriate priority in the box on the first page of the document.

Priority 1	Upon posting, this impacts all projects in construction and design with a Change Order, Addenda, and immediate change to projects being advertised.
Priority 2	Upon posting, this impacts projects being advertised.
Priority 3	Upon posting, the approved standard takes effect **four weeks** later for projects being advertised.

Action Item Update for June 28, 2007 Standards Committee Meeting

(As of June 12, 2007)

Item 1, Supplemental Specification 01554M, Traffic Control: New target date was set to August 2007 meeting during the April 2007 meeting. From John Leonard: We will incorporate it as requested by the Standards Committee into the Traffic Spec 01554. This will be done in the review and modifications to this spec, before the August deadline.

Item 2, Standard Drawings BA 4E, W-Beam Guardrail Installations and ST 8, Plowable Pavement Markers: Target date no later than October 2007 meeting. No new information.

Item 3, Supplemental Specification 02221, Remove Structure and Obstruction: Changes need to be verified so that Construction and Structures inputs are all complete. Target date no later than October 2007 meeting. No new information.

Item 4, Standard Specification 03339, Precast Concrete Deck Panel: To be completed through the special sub-group instead of the full Standards Committee. Target date no later than October 2007 meeting. No new information.

Item 5, Supplemental Specification 02822, Right of Way Fence and Gate and Supplemental Drawings FG 1A, FG 1B, FG 2 A, and FG 2B: Not approved during April 2007 meeting. Additional work needed to include coordination between Research and Enviromental. Target date no later than October 2007 meeting. No new information.

End of Agenda Package